

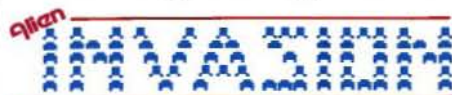
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know about the
BBC MICRO!**

THE MICRO USER

Volume 1
Number 12
February 1984
£1

INSIDE!

Two great games



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Dogs**

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for all the
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Arrays made easy

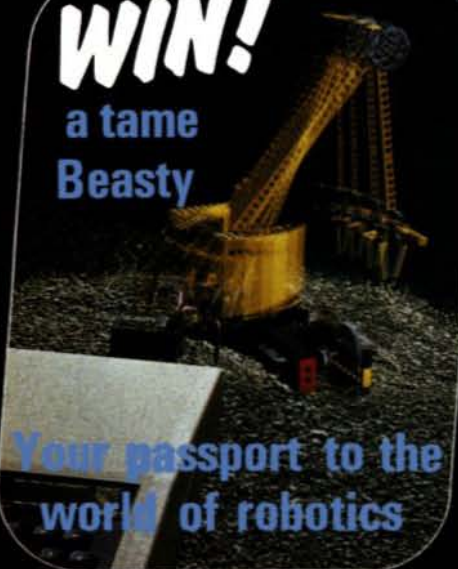
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Graphics ROM



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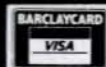
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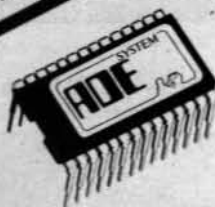
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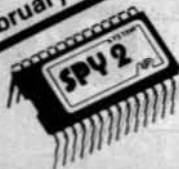
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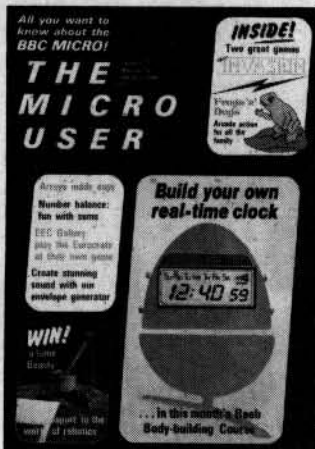
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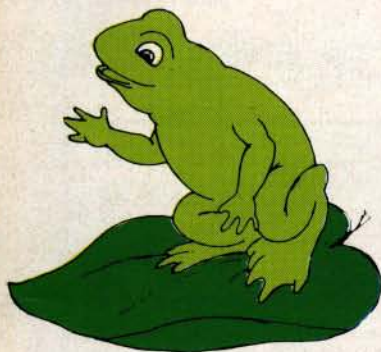
Our impartial experts give their assessment of new pieces of hardware for the BBC Micro.

143 **MICROMAIL**

The section you write yourself. Your ideas, queries and opinions make fascinating reading.

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7 COLOUR INK JET PRINTER

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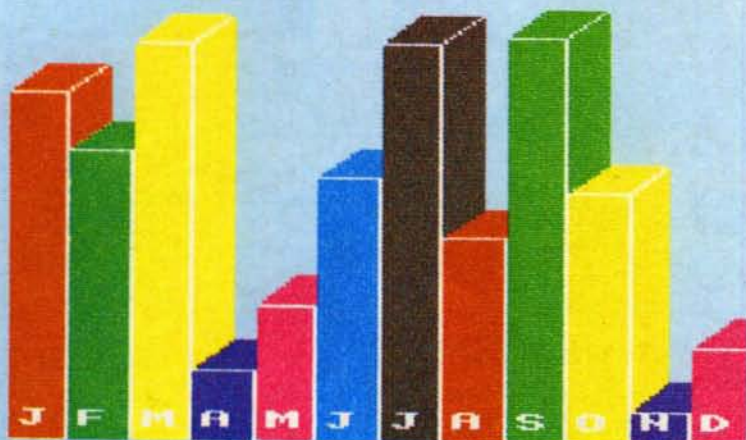
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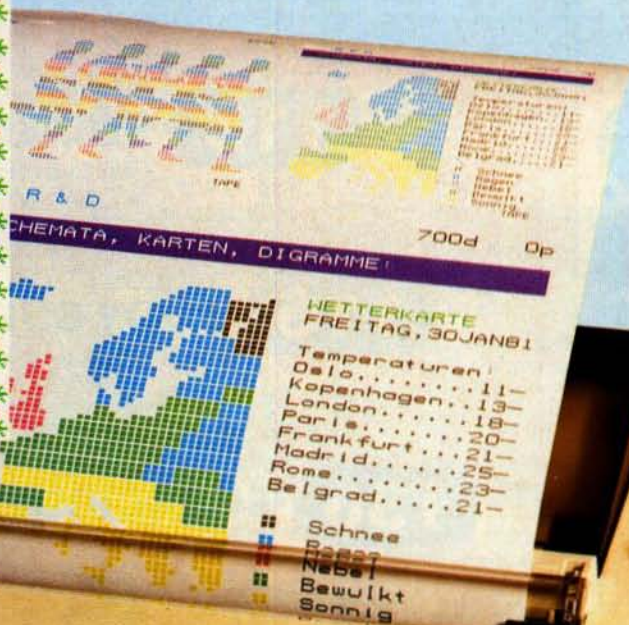
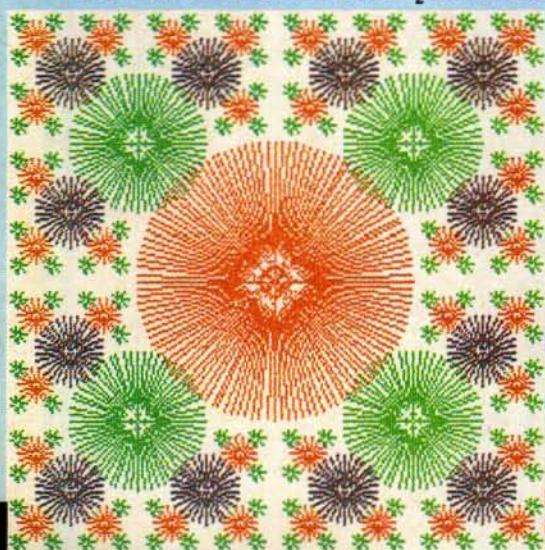
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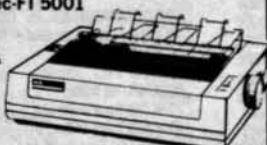
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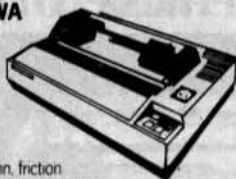
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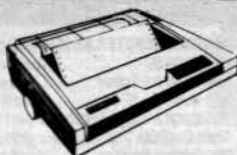
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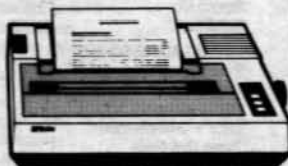
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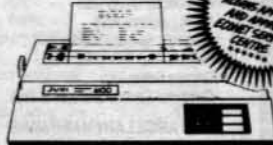
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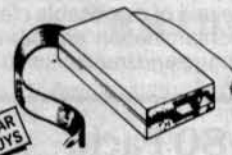
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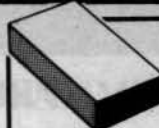
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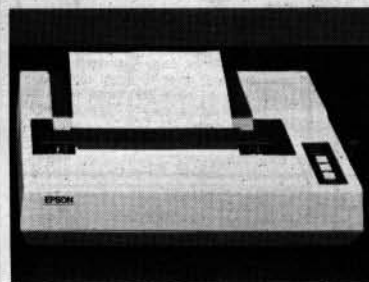
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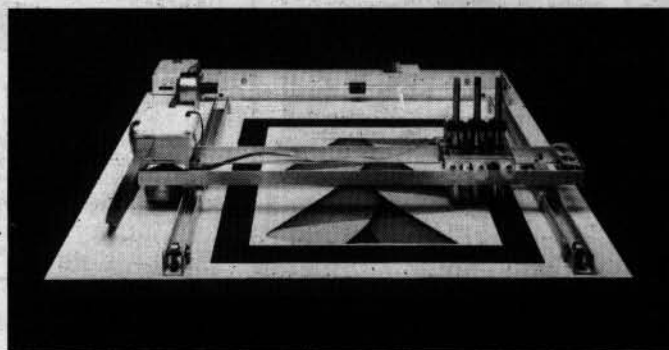
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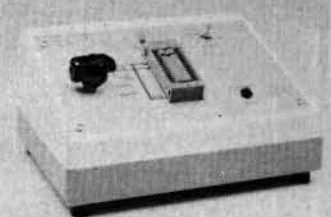
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A fully self-contained mains-powered eprom programmer housed in an attractive finished case. It is able to program 2716, 2732/32A, 2764 & 27128's in a single pass. It is supplied with vastly superior software when compared to any currently available similar programmer. In addition to normal eprom programming, you are now able to load your favourite basic programs onto eprom.

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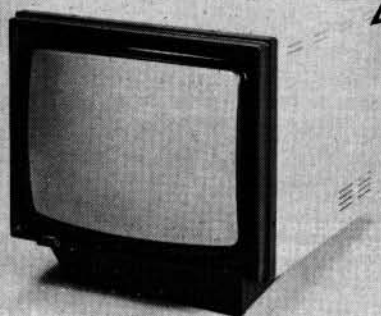
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ROMS

SOFTWARE FOR THE BBC MICRO

WORDWISE

(C) Computer Concepts 1982

- 1) Save entire text
- 2) Load new text
- 3) Save marked text
- 4) Load text to cursor
- 5) Search and Replace
- 6) Print text
- 7) Preview text
- 8) Spool text

ESC Edit Mode

Please enter choice_

WORDWISE

32K

The renowned word processing package. Still clearly the market leader with sales now over 20,000. This has become "the standard" word processor for the BBC Micro and is still receiving very favourable reviews. Wordwise will work with tape, disc or Econet and includes automatic word counting and full control over text entered into the system. Supplied with a detailed spiral bound manual and an excellent free typing tutor program. After 8 months on the market there is still no other product as simple to use and as powerful as Wordwise.

£39.00 + £1.00 p&p + VAT

GREMLIN

32K

The GREMLIN system is a powerful de-bugging tool for 6502 machine-code programs. It includes all the usual features found in good machine-code monitors, such as memory search, intelligent memory move routines, memory editors etc. These work at byte, word or string level. A built in help menu can also be displayed at any time.

This ROM contains many more unique features such as an assembler as well as a disassembler. An extremely powerful expression evaluator is included allowing complex expressions to be entered in a format that is only normally available in high level languages. Variables are also allowed (any length) and may be included into expressions.

GREMLIN allows single stepping through machine-code programs. It is also possible (on to a printer or disc) to single step through graphic routines without disturbing the screen.

Supplied with full manual, this 8k ROM has more features than any other de-bugging package for the BBC machine.

£28.00 + £1.00 p&p + VAT

```
DISC DOCTOR 1 09
DIS (<ata>) (<end>) (<ofs>)
DISCARE (<asp>) (<asp>)
DOWNLOAD (<asp>) (<adr>)
DSEARCH (<trk>) (<trk>) (<trk>) (<act>) (<drv>)
DZAP (<trk>) (<trk>) (<trk>) (<act>) (<drv>)
EDIT (<key no>)
FIND (<tr>)
FORM (<drv>) (<no trks>) (<att>) (<S>)
JOIN (<asp>) (<asp>) (<asp>)
MENU (<drv>)
MOVE (<dest page>) (<src page>)
MSEARCH (<tr>) (<adr>)
MZAP (<adr>)
PARTLOAD (<asp>) (<ofs>) (<ext>) (<adr>)
RECOVER (<trk>) (<act>) (<act>) (<adr>) (<drv>)
RESTORE (<trk>) (<act>) (<act>) (<adr>) (<drv>)
SHIFT (<src>) (<dest>) (<ext>)
SWAP (<drv>)
TAPEDISC (<asp>)
VERIFY (<drv>) (<no trks>) (<att>)
```

DISC DOCTOR

32K

This utility package has many special features for use with discs but also contains many other utilities that everyone will find useful: Function key editing, powerful disassembler, recovery of any data from the disc, merging of files, complete disc editor. Compatible memory editor, String search in memory or on disc, automatic tape to disc and disc to tape routines, built in help menus, formatting of 35, 40 and 80 track discs, and also a special format that allows 60 files per disc.

£28.00 + £1.00 p&p + VAT

TERMI - BBC TERMINAL PROGRAM RELEASE 2.0

FROM COMPUTER CONCEPTS

(C) D.J. Martin and R. Miles 1983

Function key definitions

Key	use	ENV with	CON with
F1	Printer	Start	Stop
F2	Change Mode	Start	Stop
F3	Spooler	Start	Stop
F4	Transmit file	Start	Stop
F5	Receive file	Start	Stop
F6	Handshake	Start	Stop
F7	Special funct'n	Start	Stop
F8	Special Options	Start	Stop
F9	Reset	Start	Stop

SHIFT/CONTROL FUNCTION KEYS

F8 Print Screen.
F9 Mode 7
F9 Reset XMIT block.

TERMI

32K

This program enables the BBC machine to act as an advanced terminal when connected to another computer or to a modem via the RS-423 (RS-232) interface. This provides facilities to transmit data from disc and the spooling of data from the 'line' to the disc or printer.

Termi has 3 modes of operation - dumb terminal, BBC graphics terminal and customised intelligent terminals including DEC VT52.

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- The 3" disc is totally enclosed in rigid plastic and a unique automatic steel shutter protects the delicate disc surface from dust and finger marks. For the first time discs can be used in industrial, educational and commercial environments without the worry of corrupting precious programs and data.
- The disc is "flippable" like a cassette tape and has a storage capacity of 100K on each side in single density mode (twice as much when used with a double density interface). A neat plastic switch can be flicked back and forth to write-protect valuable discs.
- The AMS disc drives are completely hardware and software compatible with 5¼" drives which can be used in parallel so allowing easy transfer of software. Consequently the 3" drives will operate with all the standard floppy disc interfaces. They take their power from the outlet provided by the BBC micro – there's no onboard power supply to corrupt data.
- The AMS package includes utilities on both a disc and an EPROM for formatting and verifying discs. The EPROM, which is easily fitted, offers a simple to use and permanent alternative to using the utilities disc.
- The impressively engineered Hitachi 3" drives feature an eject button allowing single handed operation, a multi-colour LED indicating the disc side in use, and a brushless direct-drive motor for reliable operation. The super fast track-to-track access time of 3ms is at the forefront of disc drive technology. The longest of programs are loaded in a flash.

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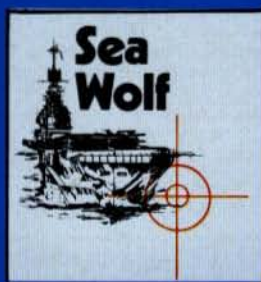
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To add to your troubles, one by one the intruders begin to achieve critical mass - you must catch and deal with each as soon as possible if you're to survive.

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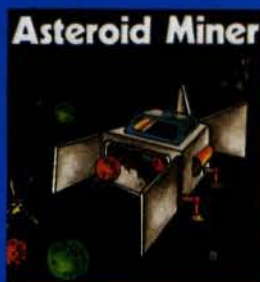


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Desperately you scan the radar screen. Should you try to get him within range of your torpedoes, or attempt evasive tactics? Can you lead your crew to safety?

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Uses for this versatile utility include shop window displays, school newspapers, personalised story books for children, and many more.

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- 4) EDITOR – display, read and alter sectors, even if you can't list the program. Highlight any byte whilst searching, make additional searches, edit bytes – now allows entry in HEX or ASCII and in string format. Dump a sector to printer, file pointers etc etc. You can now see how data is stored on a disc and alter it if you wish. Of course, it's also faster.
- 5) RETRIEVE – don't despair when you have a corrupted disc or if a program is accidentally deleted, using RETRIEVE your worries are over.

With so much from one utility it is no wonder that THE KEY is outselling programs that cost the same but provide far less.

THE KEY £12.95

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SHADOW works with 99% of all known programs including those with "locked" sections or those containing 300 BAUD sections. Handles programs of any length and works with any operating systems.

SHADOW is the definitive tape backup system. Also on the same tape is a very useful program called "INSPECTOR" which allows the user to page through memory, search for a string, etc.

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(This program for personal use only).

JOYSTICK UTILITY

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SINGLE KEY ENTRY

Requires 1.2 O.S.

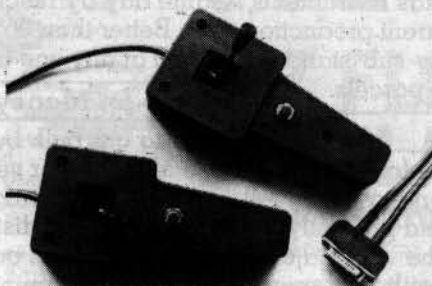
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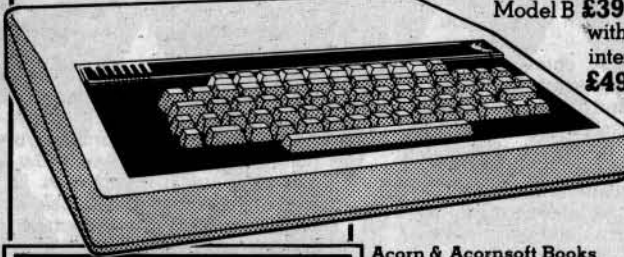
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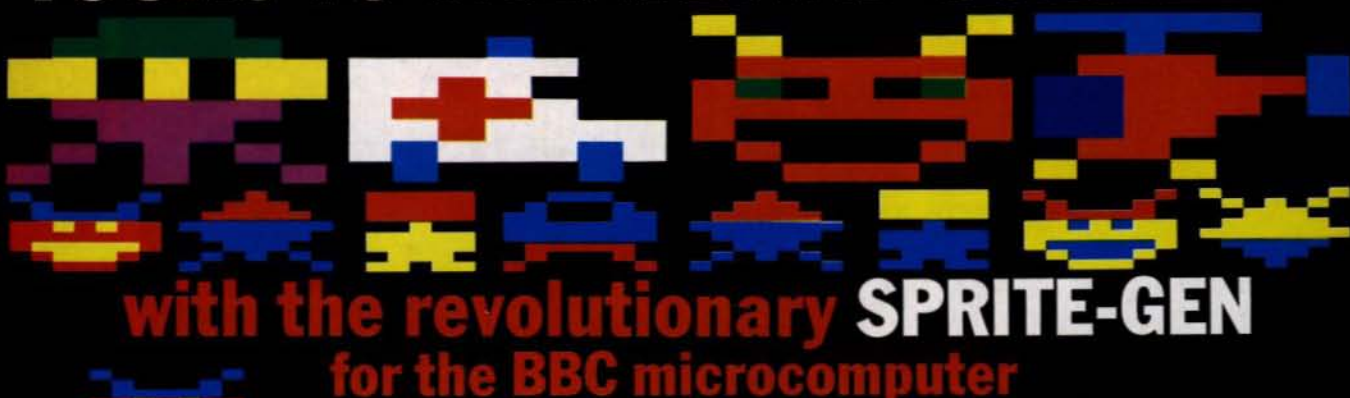
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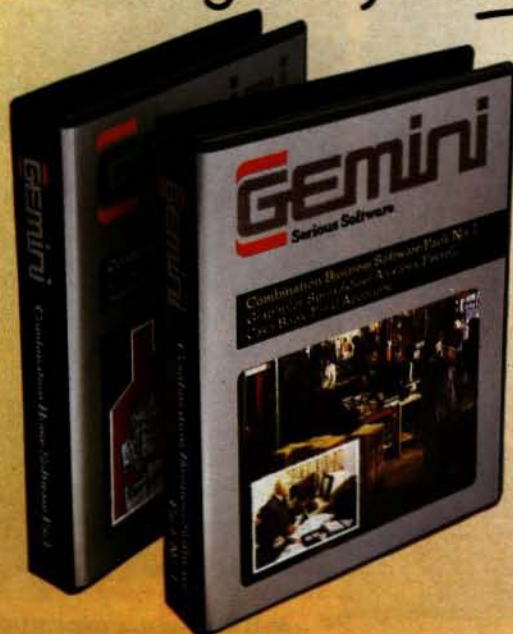
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GSL

A **GSL** COMPUTING PUBLICATION

COMPUTING NEWS

FEBRUARY
1984

ISSUE 4



The New Streamlined Winchester System

WINCHESTER SETTING THE STANDARDS IN EDUCATION

E-NET a flexible network system for the BBC microcomputer is now being installed within Education. "Doctor Challinors Grammar School" in Amersham are now operating a twelve station networking system using a 10 Megabyte Winchester Hard Disc unit.

E-NET allows up to 200 computers to share a common, large central disc store, and overcomes many of the inconvenient features of earlier network systems.

E-NET uses a hard disc unit as the central disc store, allowing upwards of 8 Megabytes of storage. It has effective, simple structures to limit the disc space available to any user, and to permit access by any user to library programs. Many users of the few simple networks installed so far have complained of the difficulty of monitoring pupil's use of disc space, but E-NET overcomes all these problems by doing the monitoring for you. You simply allocate a space limit to each user on the Hard Disc using the simple command program. For most schools and colleges this size disc will allow each user to have a reasonable file store, but it can be extended if required by adding further hard disc

units. Important files can be easily copied to minifloppies if required.

E-NET has many useful extra commands. For example a simple command which only operates from the master (teacher's) machine, and which forces each client machine (in a certain specified room or area) to load and run a particular program is included. This is very fast, and flexible, and allows for efficient use of C.A.L. packages. Care has been taken to ensure that the command structure is simple enough not to intimidate the non-specialist, while remaining flexible and robust.

E-NET allows one or more printers to be connected to the network and although this is connected to one of the network computers this computer can still be used even while the printer is in use.

E-NET is fast, simple to use and versatile. The first system being installed for use in September, and demonstrations can be arranged.

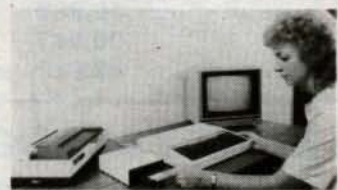
EDUCATION APPROVED DISC DRIVES MATCHING ACORN BBC MICRO

All disc drives supplied in metal case finished to match the Acorn BBC microcomputer.

Shugart SA200 Capacity 100K — Price £144.50 including Leads.

Less than two-thirds the height of standard models, Shugart's single-sided SA200 5-25 inch minifloppy disc drive offers 125 or 250 Kbytes of capacity in a low cost highly reliable package. Low cost, compact size and high reliability make the SA200 an ideal choice for entry level desk top applications in personal computers, word processors, memory typewriters, portable computers or terminal add

	Price £
5 MB Winchester System	- 1650.00
10 MB Winchester System	- 1950.00
20 MB Winchester System	- 2400.00
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105 MB Winchester System	- 5130.00
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The complete system is compact and easy to use.

ons. Package includes all interconnecting leads.

Shugart SA455 Capacity 200K — Price £238.00 including Leads.

Shugart SA465 Capacity 400K — Price £281.50 including Leads. Prices excluding carriage and VAT.

Shugarts SA455/465 half height mini floppy disc drive offer a compact alternative to standard height drives for desk top systems requiring maximum performance in a greatly reduced space. Since users can quickly double existing storage capacity by fitting two drives in the space formerly occupied by one standard minifloppy the SA455/465 drives provided and excellent means to increase storage capacity without increasing space.

NORTHERN SOLE DISTRIBUTOR APPOINTED

Due to increasing demand for GSL Winchester System, GSL Computing Limited has appointed a distributor to cover the North U.K. Market.

The appointed Sole Distributor for the North U.K. Market is: Pace Software Supplies Ltd., 92, New Cross Street, West Bowling, Bradford BD5 8BS. Telephone (0274) 729306.

Read the next ISSUE of this magazine for further developments and information of the "GSL WINCHESTER SYSTEM" and newly appointed dealers.

Showroom facility at GSL enlarged

Peripherals always available

GSL has an extensive showroom displaying all their advertised products and more. Customers are encouraged to use the equipment on show and helpful advice and personal demonstrations are readily available.

GSL know from talking to their customers that nothing is more frustrating than responding to an advertisement and finding the advertised goods are out of stock or not readily available. GSL hold large stocks of all computer peripherals advertised.

The GSL range is constantly growing and currently includes:

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- SHUGART DISC DRIVE RANGE
- NEC PRINTERS
- EPSON PRINTERS
- PRINTER BUFFER
- MICROVITEC COLOUR MONITORS
- SANYO COLOUR MONITORS
- GREEN SCREEN MONITORS
- TORCH 280
- VARIOUS SOFTWARE INCL. WORDWISE
- PRINTER PAPER

GSL Announce the Hitachi 3" Disc Drive

Due to the ever increasing demand for reliable 3" disc drives, GSL are now marketing the proven Hitachi 3" drive. Ideal for Education the Hitachi drive is reliable and robust. Cased in rigid steel the drive is coloured to match the BBC Micro.

The compact disc which is now standard in Japan are strong and easily stored, like a music cassette. By simply turning the disc over they give 100K per side. The 3" discs encased in rigid plastic are also protected by a mechanical tab which prevents overwriting of data.

Like all GSL disc drives the Hitachi 3" drive runs off the BBC power supply thus saving considerable money over drives using their own power unit.

GSL have also ensured that all their disc drives are compatible. The Hitachi 3" can be run in tandem with the Shugart 5¼" drives.

*Price including case, leads and utility disc £180.00 exclude carriage and packing and V.A.T.

GSL Computing to Exhibit at London Education Exhibition

GSL are attending the first Acorn Education Exhibition being held in Central Hall, Westminster on 25, 26 and 27th January 1984.

"We realise the importance computers now play in today's education and we will be displaying, amongst our Acorn systems our own E-NET Winchester System designed for education" said Rod Lewis, GSL's Sales Manager.

He went on to say that there has, for some time, been a growing need to have a general review of systems available to educationalists and this exhibition is to be a major showpiece for that purpose. The exhibition systems will cater for primary schools through to universities.

We will be on Stand No. 1A and I look forward to the opportunity of explaining our systems in more detail.

For further details contact: Wendy Russell



Rod Lewis (left), GSL's Sales Manager, discussing E-NET's speed, simplicity and versatility with a customer.

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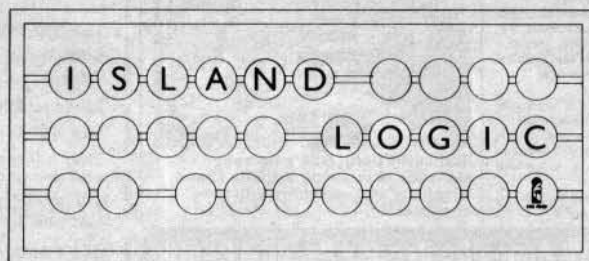
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MODEL REFERENCE	1302-1 Medium Resolution	1302-2 High Resolution
RESOLUTION	370 x 470 Pixels	580 x 470 Pixels
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(N.B. A Medium Resolution Monitor including VAT, lead, and carriage costs £187.39. A High Resolution Monitor including VAT, lead, and carriage costs £279.39.)

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For further information on these and other Cumana products — including dual slimline disk drives for the BBC Microcomputer — contact:

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the best of friends
need something
new to say
to each other...



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Make/Model of Micro _____

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FORTRAN 77 UCSD PASCAL UCSD BASIC
68000 6502



LET'S STOP PLAYING GAMES

The BBC micro is a great computer if you want to play games and learn about computing. However, if the time has come for you to stop playing games and get on with the real business of producing professional programmes for the microcomputer market, you need the UCSD p-system from Microtraffic Systems.

Program Development environments.

The UCSD p-system is the fastest growing software development system for microcomputers. Microcomputer manufacturers, software houses and more than 50,000 end users have already made the p-system their choice. And more are doing so every day. This is because:

- p-system users can write program modules in Pascal Fortran, Basic and Assembler and integrate them into a single application program.

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MICROTRAFFIC SYSTEMS

PEOPLE who have bought Acornsoft programs on tape now have the opportunity to put them onto disc – legally. Acorn has launched a service which will transfer the program from tape to disc.

All the customer has to do is to send the cassette

to Acornsoft which will copy the program to disc.

The charge will be half the price of the disc version of that program.

The address to send the cassettes to is Acornsoft, c/o Vector Marketing, Denington Industrial Estate, Wellingborough, Northants NN8 2RL.

Three inch discs are rolling in

THREE inch discs seem to have come of age with the announcement that a leading producer of disc based software is to market its products on the smaller discs.

Clares Micro Supplies of Cheshire, publishers of The Key and Replica, has joined forces with AMS of Warrington and plans to offer the whole of its range on three inch discs.

Said Dave Clare: "We see a great future for the three inch drives, particularly in the educational field".

THE pre-Christmas BBC Micro User Show was such an overwhelming success that many exhibitors have already booked for the next show.

It will be held at the New Horticultural Hall, Westminster, from March 29 to April 1.

Full report on December's show starts overleaf.

Network group

A BBC Micro network user group is being started at Bedford College of Higher Education.

Anyone interested in more information should contact Mike Taylor at The Computer Centre, Bedford College of Higher Education, (Mander) Cauldwell Street, Bedford

Unlocking programs costs firm £65,000

FURIOUS that the magazine *Personal Computer World* published details of how to break locked programs, Acornsoft took legal action, forcing the publishers to settle out of court for £65,000.

Said Editor Jane Bird: "One feels a bit sad about it, but the situation was

that it could have been a long battle and we would have lost the issue".

Injunction

Acornsoft had demanded that the offending issue be removed from the bookstalls and took out an injunction claiming that the publishers were

"inviting others to infringe Acornsoft's copyright".

Despite their surrender, PCW feel that they were right in publishing the details since this allowed disc users to transfer their programs from cassette.

Now that it has become public knowledge could

we publish the details, having courageously restrained ourselves in the past, we asked the Acorn spokesman.

"Yes, if you want. We'll add the money we get from you to the coffers – we're using it to find a new way of locking programs", he said.



LATEST arrival at Little Green School, Rickmansworth, is a fully programmable robot controlled by a BBC Micro.

EDUCATIONAL software from Golem is now available on 40 track single sided disc, as well as in cassette form for the Electron.

Already widely acclaimed in educational circles, the new formats should ensure an even wider distribution.

DEMAND IS UP FOR THE BBC MODEL A

REPORTS from dealers that Acorn has stepped up production of Model A BBC Micros owing to a component shortage were discounted by a spokesman.

"We have increased production of Models As, but this is solely due to increased demand from

dealers", he said.

Acorn does admit, however, that it has been restricting the supply to Model As.

Apparently dealers had realised they could make a better profit by ordering Model As with upgrade kits than by ordering the Model B complete.

New range of Acorn books

RATHER than publish directly through Acornsoft, Acorn has launched a range of books in conjunction with Penguin, the paperback publishers.

First in the range are two books for the Electron, "The Acorn Guide to the Electron" and "Games and Other Programs for the Acorn Electron".

The former contains much information about add-ons and second processors for the Electron.

Several more titles are planned such as Jonathan Griffiths' "How to Write Arcade Games", a rewrite of the excellent book, "Creative Assembler", which was to be published by Acornsoft.

Peter Killworth's "How to Write Adventure Games" will also be part of the new series.

Whizz kid Janet, 5, scares off politicians

ALL three main political parties pulled out of a trial by computer after the news leaked out they would be competing against a five-year-old electronic whizz kid.

The contest designed to prove who can best run the country's economy was scheduled to take place at the official opening of the BBC Micro User Show recently.

However, it was learned at the last minute that the Tories, Labour and Liberals had all got cold feet and would not be turning up at the Westminster Exhibition Centre in the Royal Horticultural Halls.

Only the SDP was in fact prepared to send along a representative, Lord Perry, a former member of the party.

But once informed that the big three would not be there, he also backed out, if somewhat more gracefully.

Contest

This left pretty, five-year-old Janet McKnight, the daughter of a London college lecturer, to demonstrate her computer and political skills alone at the launch of the four day event.

The format of the contest was to have been Simon Hessel's game - Great Britain Limited - which allows each player to become at one and the same time Prime Minister and Chancellor of the Exchequer.

After making top level decisions on the economy over a five year period - the computer assesses the likelihood of the player being re-elected for another term in government.

"We had had discussions with the parties for several weeks over whom

they would be sending along", commented Mike Bibby, Features Editor of *The Micro User*, the show's organisers.

"And we were led to believe there would be a representative from each. But what we hadn't told them was that for a bit of fun they would be pitting

their wits against a child.

"Once the news leaked out, they obviously didn't want to end up with egg on their faces if the youngster topped the poll. But she still went ahead to demonstrate how effectively a child can run the country".

"The situation proved

what a lot of people have suspected for a long time: even the smallest child can teach our political masters a thing or two ..."

Said Janet McKnight: "I don't really want to be bothered with running the country. I'd rather play Snapper".

EXIT THOSE BLACKBOARDS

ONE of the highlights of the show was the Electronic Classroom, and it created the most interest among educationalists.

Both pupils and teachers were able to experience how, despite the total removal of blackboard and chalk from the classroom environment, the BBC Micro is able to form part of a structured educational environment.

Star performer was the UTAC video-controlled unit, a pseudo-network for the BBC Micro, offering the ability to monitor and interact with each pupil far more cheaply than with standard methods.

Keyboard Training demonstrated the capabilities of the system with their TechniTouch package - a program designed to teach keyboard

familiarity using colour coding.

Such was the popularity of the classroom that it is scheduled to be a regular feature of future shows, the next of which will be held, again at the New Horticultural Hall, from March 29 to April 1.



Show celebrity Janet McKnight was in great demand from the media on opening day, culminating in a visit to broadcasting house to be interviewed by Radio One DJ Mark Page.



Janet cuts a tape to open the BBC Micro User Show

Show launch

SANDY Dow, former sales manager for Acorn, chose the December show for the launch of his firm's new products.

Already well respected for its lightpen, RH Electronics has moved into the software field with fourteen titles for the BBC Micro.

They remain, however, very much a hardware-orientated company, providing both a Euro-card expansion system for the BBC Micro and the Interbeeb, a peripheral that allows the BBC Micro to control the outside world.



Walk-in forum was great success

GATHERING place for the BBC Micro addict was the walk-in forum, the general public's chance to interrogate *The Micro User* experts.

Almost every aspect of BBC Micro lore was covered in a series of talks that were as entertaining as they were informative, ranging from machine code for the beginner to advanced interfacing.

Said one appreciative member of the audience: "It's the first time I've felt really comfortable asking questions after a lecture."

"I felt the speakers were there to share what they'd discovered about the micro with their fellow explorers rather than just display their superior knowledge".

Another enthusiast commented: "It was nice to hear people speak who obviously enjoyed their

micro as much as I do – and admitted to making the same silly mistakes".

Highpoint of the forum was the Any Questions session where it became less of a lecture and more of a discussion between BBC Micro freaks, some of whom just happened to be standing on the plat-

form.

The forum also gave people the opportunity to meet *Micro User* writers in the flesh, and in some cases put them firmly in their place.

"Are you Mike Cook?" asked one fan. "Your articles make you seem much taller".

**Secret
of
the
black
box**



PUBLIC response certainly proved that Com-motion had chosen the right name for their company.

The area around their stand was a constant traffic jam – and all because of the Microrobotics' Beasty.

The Beasty is an interface providing a simple means of driving servos, the precision geared electric motors that aeromodellers use to control their models.

As the accompanying literature puts it, a servo "allows you to twist, turn, push, pull, lift, lower, open and close almost anything".

No wonder that Beasty, with its power to control four servos from the BBC Micro, has been heartily welcomed by robotics fans as a low-cost introduction to the subject.

At *Micro User* we were so impressed that we've made it both the subject and prize of this month's competition, as you'll see if you turn to Page 55.

Zoom in with Bit Stick

MAIN focal point on the Acorn stand was the amazing Acorn Bit Stik. It was surrounded by fascinated crowds on each day of the show.

The reason wasn't hard to see. Even expert users who have become accustomed to the BBC Micro's graphics were excited by this remarkable add-on.

The Bit Stik resembles an up-market joystick. Yet it is at the heart of a highly sophisticated computer aided drawing pack-

age.

It allows the user to create high-resolution graphics simply and relatively cheaply.

The software provided encourages the user to "dither" colours, permitting multi-coloured shading of screen areas.

Perhaps the most striking feature is its ability to zoom in on pictures. This means that sections of the drawing can be enlarged or reduced at will.

The package, which should be available by the

end of March, will cost £350, including the Bit Stik itself and its ROM based software.

Although it needs the 6502 second processor and dual 80 track drives to enable it to run, the system should be a cost-effective introduction to CAD for many small businesses.

● Also displayed on the stand was Acorn's Prestel Adapter. Looking very much like the Teletext Adapter, it should sell for £90.

SECOND PROCESSOR A BIG DRAW

ATTRACTING a great amount of interest was the Z80A second processor for the BBC Micro displayed on the Watford Electronics stand.

At £299, this must be seen as a serious rival to the official, still to be released, Acorn product.

Watford's second processor is in fact a totally stand-alone computer and thus can be used independently of the BBC Micro.

As such it features a Z80A running at 4MHz with 64k of RAM, with the possibility of adding another 64k onboard.

The unit contains its own disc interface capable of dealing with 40/80 track discs, single or double density.

This interface shares the drives with the BBC Micro. It can even operate without a disc interface inside the BBC Micro.

Supporting all the OSBYTE, screen and sound facilities, the system has fully licensed CP/M 2.2 – which opens up huge amounts of ready-to-run software to the BBC Micro.

Designed

Watford have done this by taking a standard industry product designed to interface to an RS232 computer terminal and

marrying it to software that makes the BBC Micro emulate such a terminal.

The result is an "instant" second processor for the BBC Micro which is capable of considerable expansion. Boards developed for the original system already include an IEEE interface, extra RAM, real time clock and prototype boards.

Scheduled for release in the very near future, the unit comes complete with power supply in a standard half-height drive case.

ONE of the *Micro User* experts was intrigued when he received a request for technical help from the Economatics stand. Some outside force appeared to be interfering with the equipment.

The Microvitec colour monitor was displaying a near perfect colour spectrum (no, not a Sinclair). There were regular graduations of colour bands ranging from red at the top of the screen to blue at the bottom.

But the display should, in fact, have been completely blue.

Had alien invaders finally landed? Or was some more mundane terrestrial force really at work?

The solution to the problem proved to be remarkably simple.

On the top of the monitor was a harmless-looking black box which turned out to be a loud speaker. The removal of the offending object restored the display to normal.

What happened was that the magnet in the speaker was bending the electron beams to produce this unusual effect.

While on this occasion the result was nothing more than a nuisance, the people at Economatics are now wondering if they are on the verge of discovering a new art form. . .

Graphic upgrade for Beeb

ROM-based software took a great leap forward at the December Micro User Show in London.

Computer Concepts, the people who produce the Wordwise word processor chip, have produced a Graphic Extension ROM.

This adds 30 new commands to the BBC Micro, allowing users to take full advantage of its graphics capabilities. Sprites and Turtle graphics are available, as is the 16 colour, 80 by 256 resolution Mode 8.

Bradford-based Pace Disc Systems chose the show to display two new pieces of ROM-based software, Toolstar and Commstar.

Toolstar is a toolkit utility aimed at reducing program development time. It allows manipulation of Basic programs and machine memory, aiming at giving the user the "commands that the OS forgot".

The second ROM is Commstar, which promises to give the BBC Micro an "intelligent communications facility".

This allows communication with other computers and access to Prestel and other databases via a suitable modem.



Games galore on show

ALLIGATA Software chose the BBC Micro User Show to launch a new range of games for the BBC Micro.

The new titles include Eagle Empire, Neanderthal Man and Dam-busters.

At the same time they have released Bugblaster, Lunar Rescue and Fruit Machine for the Electron.

Other new offerings from the Sheffield-based firm include three home/business utilities for the BBC Model B.

Flexibase is a database, the oddly-named Alligatacalc a simplified accounting package and Scribe II a word processor system.

New add-on boosts BBC micro by up to 20k

HARDWARE add-ons were a major part of the BBC Micro User Show, and none attracted more interest than the 20k RAM upgrade from Aries.

The Aries-B20, as it is known, allows you to gain an extra 20k of memory by intercepting the official Acorn calls to the screen and switching them to its own on-board memory.

This ensures that the BBC Micro's RAM, normally tied up with screen

memory, is free for Basic programs – an increase of up to 20k in program size.

One minor drawback is that programs that directly address the screen, bypassing the official Acorn calls, can't take advantage of this extra memory, although the system does allow you to use such programs.

Despite this, Cambridge Computer Consultants, who produce the board, are convinced that the package will have large sales on the more serious side of the market since it remedies one of the BBC Micro's most serious shortcomings, lack of memory.

For instance, with

Aries B-20, View users can edit files of up to 25k in Mode 0, a four-fold increase. In Mode 7 programs the user can access 47k of memory, giving the BBC Micro a potential that several software houses are already designing programs to take advantage of.

BARRY WOOD'S TAILPIECE

DID anyone see those poor girls on the Acorn stand at our London Show? They were gorgeous. But why dress them in those outfits?

Only Acorn could do such a thing – take a fantastic product, then put it in the wrong package ...

★ ★ ★

OUR beloved features editor chose the London show to unveil to the world the fact that he has a twin brother.

Denying that this was his version of a second

processor, he claimed that he'd been playing with a disc copier and something had gone wrong.

★ ★ ★

"IT'S not fair. You reviewed our program and we've brought out another one since. The one we sent you was version 1.2. We've now brought out version 1.3, and that sometimes works, so your review is all wrong."

So muttered a software producer about the all too

accurate review of his product.

Our renowned editor took it in his stride.

"Don't worry," he replied, "that was the 1.2 version of our review."

★ ★ ★

SPOTTED at the show – a tee-shirt stating: "Electron Users make it last twice as long ..."

★ ★ ★

YOU won't believe it, but it's really true. One structured programming freak has actually blown himself a Basic

ROM that produces "Syntax Error" when you use a GOTO or GOSUB!

★ ★ ★

ACTUALLY, the ultimate blow in the "Structured Programming" debate was dealt when our omniscient editor demanded that one of our writers rewrite a program containing the dreaded GOTOs and GOSUBs.

This the miscreant did, replacing the offensive statements with PROCgoto and PROC-

gosub. We feel that honour has been satisfied.

★ ★ ★

ONE of our artists is a Greenham Common veteran. On being told that "those things at the bottom of the screen" in Alien Invasion were silos, she replied: "Well, why aren't there women dancing on them?"

★ ★ ★

OVERHEARD at the show's technical advice stand: "I've just bought an Electron."

"Oh, you're the one," chorused the crowd in unison.

Drives of the future



Now available for the BBC Microcomputer, this superb range of high performance, low profile disc drives which give more data storage, and use less space.

The Pace range of drives include drives which are switchable between 40 and 80 tracks. As these drives are double sided they give a massive 400 k *per drive* in 80 track mode, whilst in 40 track mode they retain compatibility with Acornsoft and other

commercially available software. These drives feature colour LED's to indicate operation.

All Pace drives are capable of being used as double density drives so that, as and when, a double density filing system and interface become available, the disc storage capacity will be doubled (eg. the dual 40/80 drive will have an unbelievable 1.6m of storage).

Pace disc drives are designed to run off the BBC power supply and are supplied complete with all cables, a utilities disc and manual.

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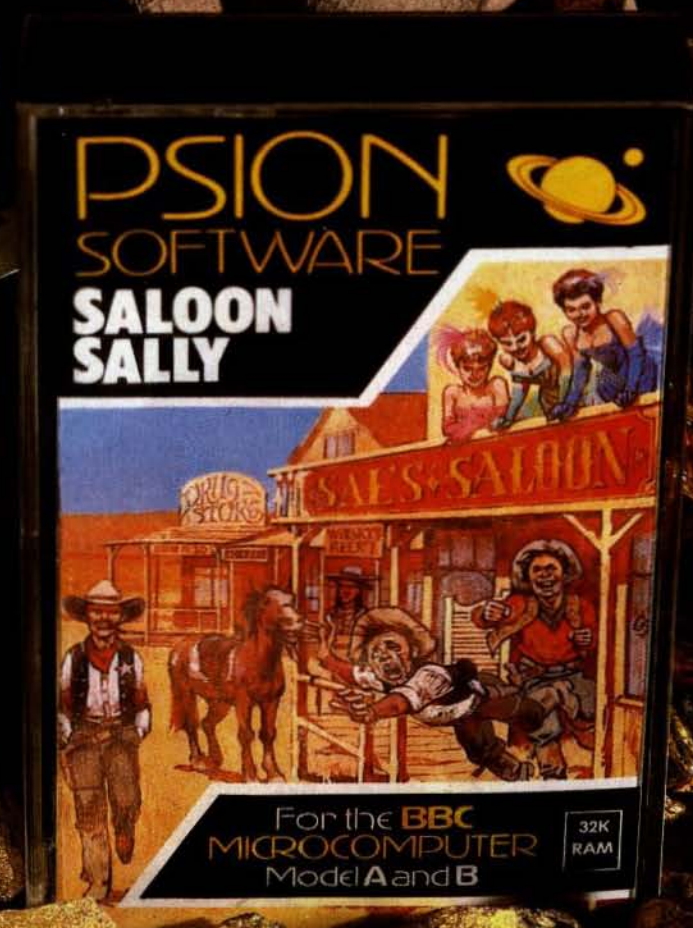
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PDD5	Single Sided 40/80 Track (400k)	£449	£516.35

Available from good computer stores everywhere including:

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Turn the tables on the Cowboys

SALOON SALLY is in a tricky situation. After an evening of drinking and gambling, four roughneck cowboys are wreaking havoc in Sally's saloon.

While the fight progresses Sally spots her chance to pick up the gold lying around. Guide her from table to table filling her pockets but watch out in case the cowboys catch her.

As the pianist pounds away regardless of the commotion, Sally can keep the cowboys at bay by hurling tables and chairs. But the action gets more hectic and the music gets faster—you'll need all your wits about you to keep up with the pace.

SALOON SALLY from Psion Software is a compulsive and addictive machine code action game exclusively for the BBC Microcomputer (Model A and B with 32K RAM).

Available from W. H. Smith, Boots and all good software retailers for only £7.95.

The whole range of quality Psion Software, including the popular Vu-Calc and Vu-File applications programmes are available from W. H. Smith, Boots and all good software dealers.



Dealers are invited to contact Psion to find out details of substantial discounts for trade orders of our best selling software for the BBC Microcomputer.

LORDS OF TIME

Joins our range of acclaimed pure-text puzzle adventures, at £9.90, for:

BBC 32K **COMMODORE 64** **SPECTRUM** 48K **LYNX** 48K **NASCOM** 32K **ORIC** 48K **ATARI** 32K

ADVENTURE REVIEWS

"Adventures which have a fast response time, are spectacular in the amount of detail and number of locations, and are available to cassette owners... I am extremely impressed... The Level 9 Adventures are superbly designed and programmed, the contents first rate. The implementation of Colossal Cave (Adventure) is nothing short of brilliant; rush out and buy it. While you're at it, buy their others too. Simply smashing!"

— *SOFT, Sept 83*

"I found Dungeon exceedingly well planned and written, with a fast response. There are well over 200 locations and the descriptions are both lengthy and interesting. The objects number about 100. It could therefore take some months to explore the whole network, giving many hours of enjoyment in the process."

— *C&VG, Sept 83*

"The descriptions are so good that few players could fail to be ensnared by the realism of the mythical worlds where they are the hero or heroine... great fun to play."

— *Which Micro?, Aug 83*

"My appetite has been whetted and I intend to get my own copy (of Snowball) to play."

— *What Micro?, Dec 83*

ADVENTURE REVIEWS

"This has to be the bargain of the year. If adventures are your game then this (Colossal Adventure) is your adventure."

— *HCW, 5 Sept 83*

"Colossal Adventure is simply superb. Anyone who wishes to use adventures in an educational setting really must use and see this program as it emulates Crowther and Wood's masterpiece so well. For those who wish to move onto another adventure of similar high quality, Dungeon Adventure is to be recommended. With more than 200 locations, 700 messages and 100 objects it will tease and delight!"

— *Educational Computing, Nov 83*

Colossal Adventure is included in Practical Computing's Top 10 games choice: "Poetic, moving and tough as hell."

— *PC, Dec 83*

"To sum up, Adventure Quest is a wonderful program, fast, exciting and challenging. If you like adventures then this one is for you"

— *NILUG #1.3*

"Colossal Adventure... For once here's a program that lives up to its name... a masterful feat. Thoroughly recommended"

— *Computer Choice, Dec 83*

"wholly admirable"

— *Your Computer, Sept 83*



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The trilogy is completed by this superb adventure, set in the Dungeons beneath the shattered Black Tower. A sense of humour is essential!

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THE LORDS OF TIME SAGA

7: LORDS OF TIME

Our congratulations to Sue Gazzard for her super design for this new time travel adventure through the ages of world history. Chill to the Ice-age, go romin' with Caesar's legions, shed light on the Dark Ages etc. etc. We'll be selling this game mail-order from January 1st.

Price: £9.90 each (inclusive)

Level 9 adventures are available from good computer shops, or mail-order from us at no extra charge. Please send order, or SAE for catalogue, to:

LEVEL 9 COMPUTING

Dept U, 229 Hughenden Road, High Wycombe, Bucks HP13 5PG

Please describe your Computer

THIS month we're going to look at the features the different modes on the BBC Micro provide.

However, before we do so, we'll cover a useful command we've neglected so far - GET\$.

Look at Program I. Line 40 is:

```
40 string$=GET$
```

When the computer reaches this line it waits for a key to be pressed. As soon as you press a key, the micro continues with the next line of the program.

The variable *string\$* now contains the character whose key you pressed. For instance, if you'd hit the letter "A",

```
PRINT string$
```

would print out the character "A".

```
10 REM *** PROGRAM I ***
20 MODE 6
30 PRINT "When you are ready, pre
ss a letter"
40 string$=GET$
50 PRINT "You pressed " string$
```

Run Program I and you'll soon see what happens.

Notice two points:

- Unlike INPUT, you do not have to press Return.
- Again, unlike INPUT, the variable used for storage only contains one character.

As well as GET\$, there is GET. Notice that this has no "\$" symbol on the end. This is because GET returns a number, which must be stored in a numeric variable, unlike GET\$.

On encountering GET, the micro waits until a key is pressed, then continues. The actual value that GET obtains from the keyboard is the Ascii code of the key pressed.

Look at Program II. Line 40 reads:

```
40 ascii=GET
```

When it reaches it the program waits for a key to be pressed, at which it continues.

If you pressed "A", the variable *ascii* would contain the value 65, which you'll remember, if you cast your mind back, is the code for "A".

Run Program II to see how it all

Get yourself in

Which of the BBC MICRO'S eight modes

```
10 REM *** PROGRAM II ***
20 MODE 6
30 PRINT "When you are ready, pr
ess a letter ";
40 ascii=GET
50 PRINT "The character had Ascii
code ";ascii
60 PRINT "This means it was "CHR$
(ascii)
```

```
10 REM *** PROGRAM III ***
20 CLS
30 REPEAT
40 PRINT "Next Mode?";
50 mode=GET-48
60 MODE mode
70 FOR loop=1 TO 20
80 PRINT "THIS IS A DEMO"
90 NEXT loop
100 UNTIL FALSE
```

works. Line 50 prints out the Ascii code of the character you inputted and line 60 uses CHR\$ to translate it into a character. Don't leave a space between CHR\$ and (.

Program III, which we're going to use to examine the BBC Micro's modes, uses GET to input the mode you want to look at (line 50).

Notice how I label the GET statement in line 40. It's bad practice not to tell people that you want them to enter something from the keyboard.

Line 60 then changes mode, and 70 to 90 consist of a FOR . . . NEXT loop printing out "THIS IS A DEMO" 20 times.

The whole affair is wrapped up in a REPEAT . . . UNTIL FALSE loop, so that you are repeatedly asked which mode you wish to view.

Once you understand it, try looking at the various modes with Program III.

The size of the letters varies in each mode. In Modes 2 and 5, you can have

only 20 characters across the screen.

Modes 1, 4, 6 and 7 allow 40 characters fit into the width of the display, while Modes 3 and 0 have 80 characters across.

At first all this diversity may seem a little confusing. However, it's all fairly simple and logical if we take it step by step.

You see the more characters you have to cram across the screen the more memory your micro has to set aside to remember what's happening on the display.

The more memory the micro reserves for the screen the less it has to store the program in. So it is often a trade-off between program size and the number of characters in the display.

It still might seem a little odd that we have more than one mode with the same number of characters in a row. For instance, Modes 1, 4, 6 and 7 all have 40 character rows.

Each of these modes, however, has

**Mode
0, 1, 2, 3,
4, 5, 6,
or 7?**

the right mode

is the best one for your program?

characteristics that differ.

First, let's put Mode 7 to one side. This is the Teletext mode, the one the Electron hasn't got, and it works very differently to the others.

So that leaves us with Modes 1, 4 and 6 that have 40 characters to the row.

Try running Program III entering Mode 6 first, the one in which we've done almost all our work. Then try it for Mode 4, then Mode 1.

You should notice that in Mode 6 you get far fewer lines on the screen than you do in Modes 4 and 1. This is because Mode 6 puts more space between the lines.

You see, Mode 6 is a text only mode intended for word processing, and the extra spacing is designed for clarity.

In fact Modes 4 and 1 allow you 32 rows of 40 characters, while Mode 6 allows you only 25 rows of 40 characters.

We still haven't distinguished between Modes 4 and 1 though. After all,

they both have the same number of characters, so why bother with two of them?

The answer is colour, a subject that we have so far avoided.

Mode 1 allows you four colours on the screen at the same time, whereas Mode 4 allows only two.

So why not opt for Mode 1 all the time? The answer is memory. Mode 1 has to use exactly twice as much memory as Mode 4 to obtain the extra colours, and sometimes this is a bit too profligate.

In fact, on Model A computers you cannot even use Mode 1 because there isn't enough memory.

If you now use Program III to experiment with Modes 5 and 2 you will see that both give you 32 lines of 20 rather chunky characters.

However, as you probably suspect by now, Mode 2 allows you more colours than Mode 5 - 16 as opposed to 4.

Using Program III with Modes 0 and 3 shows that, while both give you 80 character rows, Mode 0 gives you 32 rows while Mode 3 gives you only 25 rows, leaving gaps between for clarity, as did Mode 6.

Mode 3 is for text only, as was Mode 6. Text-only means that the mode can't support graphics. It cannot draw the multicoloured lines and triangles associated with the BBC Micro's graphics modes.

However we're getting ahead of ourselves. Next month we'll look at colour on the BBC Micro. Then, armed with some useful Basic commands, we'll cover graphics.

Meanwhile, here are the answers to the problems I set you last month.

Programs VIIa and VIIb show alternative ways of inverting the triangle of asterisks we showed in last month's Figure IIIb.

As you can see, you can either tinker with the effect of the loop variable by providing a new offset, or you can rejig

the whole loop by altering the step (Programs IV and V).

I also asked you to invert the triangle of asterisks produced by last month's Program VIII. Programs VIIa and VIIb show two ways of doing this, again by altering either the offset or the loop parameter.

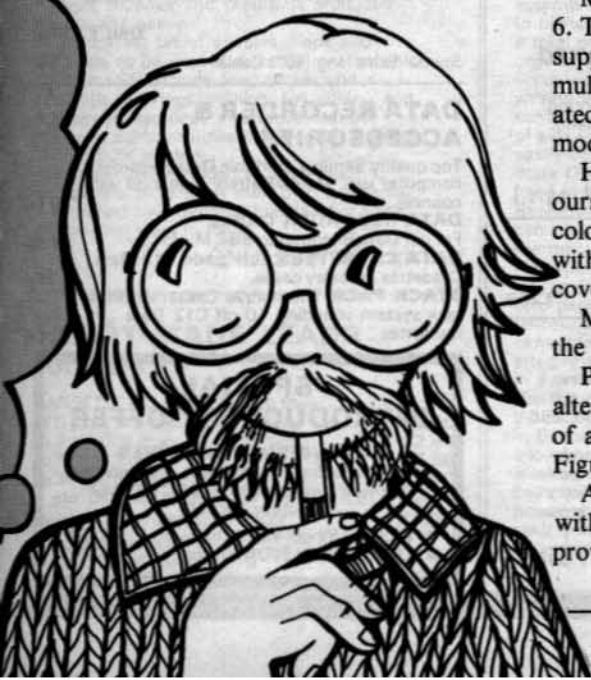
I'd be very happy to hear from readers who've found alternative solutions.

```
10 REM *** PROGRAM VIIa ***
20 REM *** JANUARY ***
30 MODE 6
40 FOR loopZ=0 TO 10
50 asterisk$=asterisk$+"*"
60 PRINT TAB(10-loopZ,10-loopZ)
  asterisk$
70 NEXT loopZ
```

```
10 REM *** PROGRAM VIIb ***
20 REM *** JANUARY ***
30 MODE 6
40 FOR loopZ=10 TO 0 STEP -1
50 asterisk$=asterisk$+"*"
60 PRINT TAB(loopZ,loopZ) asteri
  sk$
70 NEXT loopZ
```

```
10 REM *** PROGRAM VIIa ***
20 REM *** JANUARY ***
30 MODE 6
40 asterisk$="*"
50 FOR loopZ=0 TO 10
60 PRINT TAB(10-loopZ,10-loopZ)
  asterisk$
70 asterisk$=asterisk$+"*"
80 NEXT loopZ
```

```
10 REM *** PROGRAM VIIb ***
20 REM *** JANUARY ***
30 MODE 6
40 asterisk$="*"
50 FOR loopZ=10 TO 1 STEP -1
60 PRINT TAB(loopZ,loopZ) asteri
  sk$
70 asterisk$=asterisk$+"*"
80 NEXT loopZ
```



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BBC MICROCOMPUTER

Model A—£260; Model B—£346

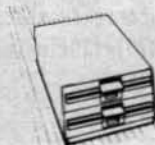
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All you require is a mains power point to have it up and running (we even supply the 4 way mains trailing socket).

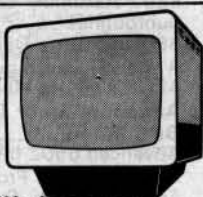
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- * Commands include line, circles and rectangle drawings, infilling, full editing and an easy to use copy and move feature.
- * Screen dump routines included for Seikosha and EPSON printers.
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Beebmon can even run itself. In so doing you can nest Beebmon up to a level limited only by the memory size. Beebmon uses 256 bytes of workspace, located anywhere in memory, even on the 1MHz Bus. Beebmon effectively uses no zero page workspace, so your program (e.g. BASIC) can use any or all of the base page. How does it achieve this? By providing a 6502 interpreter all programs running under it exist in a virtual BBC, so special memory locations like the ROM latch are not actually accessed by your programs, instead they alter a location in Beebmon's workspace. Emulation also allows immediate return to Beebmon command level by ctrl-escape no matter what code is being executed at the time. All this exceptional power and flexibility is complemented by a clear and detailed manual included in a value for money price of:

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Just look at these features:

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Without a doubt, the most sophisticated DFS Software yet written for BBC Micro Computer. This powerful new DFS is fully compatible with ACORN DFS yet has much increased power due to additions, carefully designed to make life easier in normal use. It consists of over 14K of efficiently written machine code. It is entirely self contained and so does not require a utilities disc to function.

* The system can either use the ACORN standard 31 files per disc side or DOUBLE THE CAPACITY to 62 files. The size is selected at formatting time. Copying between discs with different catalogue sizes works perfectly normally.

* A FORMATTING PROGRAM is built in, permitting formatting to 35,40,80 track formats with either 31 or 62 files. Since the formatter is built in to the DFS it can be used without affecting whatever program you are using.

* A DISC VERIFIER is also built in. This checks the internal checksums on each sector to identify any corrupted data. This is extremely useful when saving valuable data as it shows faulty discs quickly and easily. Again it does not affect the program you are using.

* A built in DISC SECTOR EDITOR gives a screen window onto the disc enabling detailed editing of any byte on the disc. This is very useful for recovering accidentally deleted files and can save weeks of work.

* A double step mode allows the user of 80 TRACK DRIVES TO READ 40 TRACK DISCS. This mode is software selected for each drive individually, thus allowing a 40 track disc to be copied onto an 80 track one very easily. THIS ELIMINATES THE NEED FOR EXPENSIVE SWITCHABLE DRIVES.

* A WORKFILE function sets the name to be used when the null filename is issued. This allows a program to be edited and repeatedly saved having only typed its name once.

* When using LOAD, CHAIN, etc. it is possible to specify an ambiguous filename. This will result in the first file whose name matches the specification being used. This saves typing the end of a filename that you know is uniquely identified by its first few characters.

* Two commands exist to simplify the transfer of programs from TAPE TO DISC. These load the file to &1100, switch off the disc system and then move the file to its correct load address; thus saving a lot of complicated programming. This command can be used to load files up to 27K75 long.

* An advanced COPY command is included which will prompt the user, requesting whether to copy each file.

* RENAME has been extended to allow the use of ambiguous filenames. This allows you to change BERT1, BERT2, BERT3 to FRED1, FRED2, FRED3 with only one command.

* OPENOUT has been improved to give you fewer annoying 'Can't extend' errors, as it automatically picks the biggest space on the disc in which to put a file. A SPACE command lets you know how much space *COMPACT could create before you waste time doing it. * 2K of RAM can be reclaimed from the DFS by setting "PAGE" to & 1100.

Now with extra features:

* The powerful library system has been extended so that libraries now work on all accesses not only *RUN. This allows you to have a utility directory with all your commonly used programs without muddling in your current workfiles. Very useful for BCPL User.

* Programs can now reside lower in memory by reclaiming some of the DFS' workspaces, indeed PAGE can be taken as low as &1100 under most circumstances.

* To make DFS easy to use, wild cards ("*") have been made vastly powerful, e.g. *INFO

A gives information on all files in the current directory which have an "A" anywhere at all in their filename.

* Comprehensive and clearly written Manual (available separately) gives the user a complete package deal.

* Fully compatible with BBC TELETEXT and TORCH Systems

DFS ROM ONLY £35
Complete Disc Interface Kit including DFS ROM and fitting instructions ONLY £75
Comprehensive and clearly written DFS Manual ONLY £7.50

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P.S. We will exchange your existing ACORN DFS or PACE (AMCOM) DFS for the highly sophisticated Watford's DFS ROM for ONLY £30

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This ROM is an integrated, menu-driven DISC MAINTENANCE PACKAGE. Using simple menu selections, with intelligible prompts for any input required, the user can recover data from damaged discs. Facilities include:

- Full screen editing of sectors on the disc.
- Sectors can be found by file name or sector number.
- Files and sectors can quickly and easily be dumped to a printer for examination and possible subsequent modification.
- COPY: blocks of data can be copied from any point on the disc to any other point. Blocks can be as small as one byte and can be transferred anywhere in a sector.
- SEARCH: The disc can be searched for any string, starting and finishing at any designated sector.
- VERIFY: Any block of sectors can be checked for their validity.
- FORMAT: Any track or group of tracks can be individually formatted to Acorn or Watford DFS standard.
- INSERT: Allows the manual creation of new directory entries to allow "undeletion" of files.
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N.B. All the above Gemini software is on tape For Disc Based (40/80 track) please add £3.

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Two versions available:

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JUNIOR MATHS PACK (32K) £6.95

Makes learning fun for 5-11 year olds. This package consists of 3 programs (menu driven) that increase in difficulty as your child becomes competent. A very good supplement to standard educational methods.

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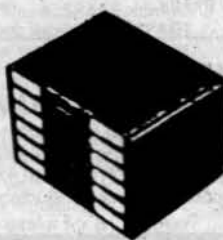
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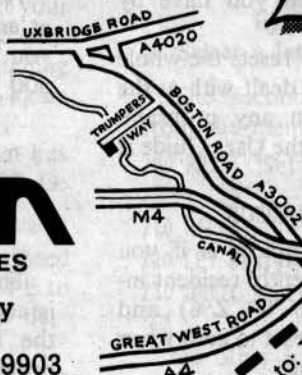
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After you're human

By IAN MURRAY

*EXCRUTIATING ... UGH! ...
what on earth does that mean
... Oh no - not again!*

These are some of the more printable cries of frustration that a typical home micro user is likely to utter when trying to run much of the software currently available.

Nor is the home micro user alone in his frustration. There is a wealth of useless software available for the educational market as well.

This yields comments such as: "*Oi Str - look what this does*". Or: "*Is it meant to do that Miss?*"

Or, more insidiously, just silence as the youthful scholar finds that the program has crashed and begins to roam around the operating system as if it were a huge doodle-pad.

A user friendly program is one that accepts that the user is actually a mortal human. Which means he is quite capable of acting like a demented maniac in charge of a cruise missile.

It assumes that each and every key on the keyboard will be pressed, in any combination, at some time - even if it is only done 'just for fun'.

Ideally this should extend to the ON/OFF switch at the back of the BBC

Micro. But for the purposes of this article I take it that you have already guarded against that particular act of malevolence.

User friendliness can be divided into three main areas:

- Anticipating the actions of human beings.
- Helpfully correcting the actions of human beings.
- Making the human being feel he is not dealing with a computer.

The first is the subject of this article while the latter two will be covered in future issues of *The Micro User*.

The first two keys to deal with are BREAK and ESCAPE. If you have version 1.0 of the operating system or later, then your options are slightly wider. Find out which you have by typing *FXO.

As the BREAK key resets the whole system, this should be dealt with at the earliest opportunity in any program. The method shown in the User Guide is probably the best:

```
10 *KEY10 OLD:MRUN:M
```

The only major problem is if you have used the permanently resident integer variables (A% to Z%) and assume that they are reset to zero when you run. They are not.

Your next lines of Basic must then

assign the start values you want to any of these variables, such as:

```
20 B%=0:D%=0
```

Now on pressing BREAK your program will not let the user have a tour of the operating system and will re-run successfully. Provided, of course, that you haven't used any clever tricks such as deleting part of the program as you run.

The easiest way of dealing with the ESCAPE key - and this is applicable to all operating systems - is to trap it with the ON ERROR command.

This, like trapping the BREAK key, must occur at a very early stage in the program. For example:

```
10 ON ERROR GOTO 500
```

As the ESCAPE key is considered as error message 17, pressing it directs you to line 500. Subsequent lines at 500 could be as follows:

```
500 IF ERR = 17 THEN RUN
520 MODE7
530 REPORT
540 PRINT;" at line "ERL
550 END
```

The solution is fundamentally unsatisfactory as we now have two keys on the keyboard which will re-run the program.

Because we reached line 500 via an

all, only

absolute jump we cannot retrace our steps to where we came from.

But fear not! Sir Galahad Acorn has provided a solution to the gallant knights with OS 1.0 and OS 1.2.

We may either 'hang up' the ESCAPE key entirely or re-assign it to another key:

```
10 ON ERROR GOTO 1000
20 *FX229,1
30 REPEAT
40 PRINT "PRESS ESCAPE"
50 PRINT "No luck!!"
60 PRINT "Press Q to exit"
70 A$=GET$
80 UNTIL A$="Q"
90 PRINT MISTAKE
1000 MODE 7
1010 REPORT
1020 PRINT;" at line "ERL
1030 *FX229,0
1040 END
```

The *FX229 call has been used to turn off the ESCAPE key at line 20 and turn it on again at line 1030, which presumably you would wish to do. When you run the program you will notice that the ON ERROR has not been affected and correctly traps the deliberate error at line 90.

You may, of course, decide that your programs should still have an ESCAPE get-out. This is possible by assigning the ESCAPE key to another key, again at line 20.

You ought to choose a key that has no conceivable use. I suggest CTRL-O:

```
20 *FX220,0
```

This is keys CTRL and @ pressed down together. To restore ESCAPE to its rightful key, line 1030 should be:

```
1030 *FX220,27
```

I personally would avoid *FX220

calls in the finished program as it still provides the user with a combination of keys with which to experiment, and sooner or later some latent Einstein will find them.

I suggest using the *FX220 call while developing pre-release versions of the program.

When using the ON ERROR command make certain that you direct it to a line that exists. If you don't you will get a program that gives an impression of locking-up, but is in fact in an endless ON ERROR loop.

Having dealt with the obvious keys, you still have to out-smart the nine year old's propensity to destroy all your handiwork. Now you have to anticipate his every move across the keyboard. Can you do it? Is it even possible?

The secret is to *never* use the INPUT or INPUT LINE commands as up to 255 characters can be entered with these commands. Someone merely repeating a key could enter a string so long that it would corrupt the screen display.

The answer is to always use the GET and GET\$ commands, which only collect a single character at a time. You will need to provide your own delete routine where you think it's needed (see below).

However firstly turn off the auto repeat feature at the beginning of the program with:

```
10 *FX11,0
```

This will at least protect you from accidental entry of more than a single character.

Where your programs are menu driven - that is, your progress through the program depends on an item selected from a screen menu - then you should lay out your display something like this:

PROGRAM OPTIONS

- A) Create a File
- B) Amend a File
- C) Delete a File
- D) Sort a File
- E) Search a File

Select a letter from A to E >>

The section of program to select from the menu may look like this:

```
200 PRINT "Select a letter from A to E"
>> *;
210 REPEAT
220 LET Reply$ = GET$
230 UNTIL Reply$ >= "A" AND Reply$ < "F"
```

No other input will successfully get past this. However you may be locked

in the wrong size letters - small instead of capitals.

Line 230 can be extended with a complicated logical expression to cater for this or you may use the following alternative:

```
230 UNTIL INSTR("ABCDEabcde",
Reply$) > 0
```

This again is not totally satisfactory as your analysis of the menu selection will still involve you in converting the lower case letters to upper case before deciding what action your program is to take.

For this reason it is better to use numbers on the menu selection. But take the number in as a character. This would involve a change of line 230 to:

```
230 UNTIL Reply$ > "0" AND Reply$ < "6"
```

with the other obvious changes in any menu.

As a program designer you must decide whether the theory of your program will allow the user, in answering a question, to enter any character or a selection from a limited subset of characters.

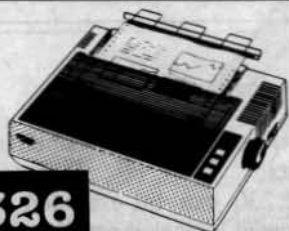
This is particularly relevant when trying to get in numbers, or even names.

For example, when entering numbers you may feel that you will allow 0123456789., but not allow other valid mathematical characters such as "-/+*". This is possible using the GET\$ command, but not possible with the INPUT commands.

You will presumably still want the RETURN key to be used to signal the end of the numbers' input. The following suggestion may help your thinking:

```
100 PRINT "Enter a decimal number >>"
";
110 REPEAT
120 REPEAT
130 R$=GET$
140 UNTIL R$ = CHR$(13) OR INSTR("0123456789.",R$) > 0
150 PRINT R$;
160 IF R$ <> CHR$(13) THEN Number$ = Number$ + R$
170 UNTIL R$ = CHR$(13)
180 Number = VAL(Number$)
190 PRINT
200 PRINT Number
```

You can extend your control over the input by putting a restriction on its length at line 160 with the use of the LEN command. However the implication of this is that you will need to write



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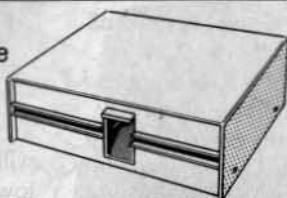
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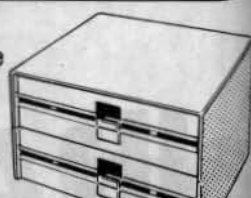
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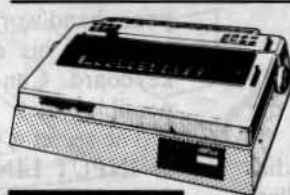
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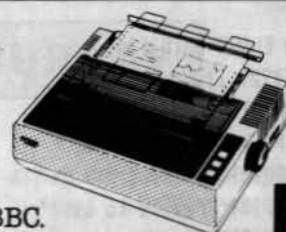


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BBC % DC

From Page 43

your own delete routine.

This routine involves counting-in every character that passes any other restrictions you may have, and allowing the delete character, CHR\$(127), to be printed to the screen but not added to the final accepted string of characters.

Of course you will have to remove the most right hand character from the string input.

Restricting the length of the string

```

100 CLS
110 C=0
120 PRINT "Enter a four digit number
>> ";
130 REPEAT
140 REPEAT
150 R=GET
160 R$=CHR$(R)
170 Z=INSTR("0123456789", R$)
180 UNTIL R=13 OR Z<>0 OR (R=127 AND
C>0)
190 C=C+1
200 Number$ = Number$ + R$
210 IF R=13 THEN C=C-1
220 IF R=127 THEN C=C-2
230 N$ = LEFT$(N$,C)
240 IF (C>4 AND R<>13) THEN
C=4;R$=""
250 IF R<>13 THEN PRINT R$;
260 UNTIL R=13 AND C=4
270 Number = VAL(Number$)
280 PRINT
290 PRINT Number

```

Figure 1

input creates a snag. You must allow the delete character to be the only character that can be the "length of the string + 1", so that you may delete the last character if required. A simple example of this is shown in Figure 1.

With little difficulty this type of routine can be made a procedure with parameters that can be specified. This will ensure your program does not slide to an unsuitable length.

The important point is that if the programmer is to be truly user friendly

in controlling and directing the user's general keyboard inputs, then the program will inevitably be lengthy.

As a rule of thumb, I believe you must expect 90 per cent of every program to be devoted to user friendliness, and only 10 per cent to the algorithm.

The cursor control and copy keys should also be taken out of action unless required in the program. From OS 1.0 onwards you may do this by using the *FX4,1 or *FX4,2 calls.

The former disables cursor editing and the latter permits redefinition of these keys similar to the red function keys. The normal mode is turned on with *FX4,0.

Subsequent articles will look at validation, helpful ways of correcting the user's errors, and how to make your BBC Micro actually seem relatively human.

Till then, a final tip: Always try your programs out on a complete dodo. In the business of friendliness there's none better than a complete idiot to discover what a fool you have been!

Teachers!

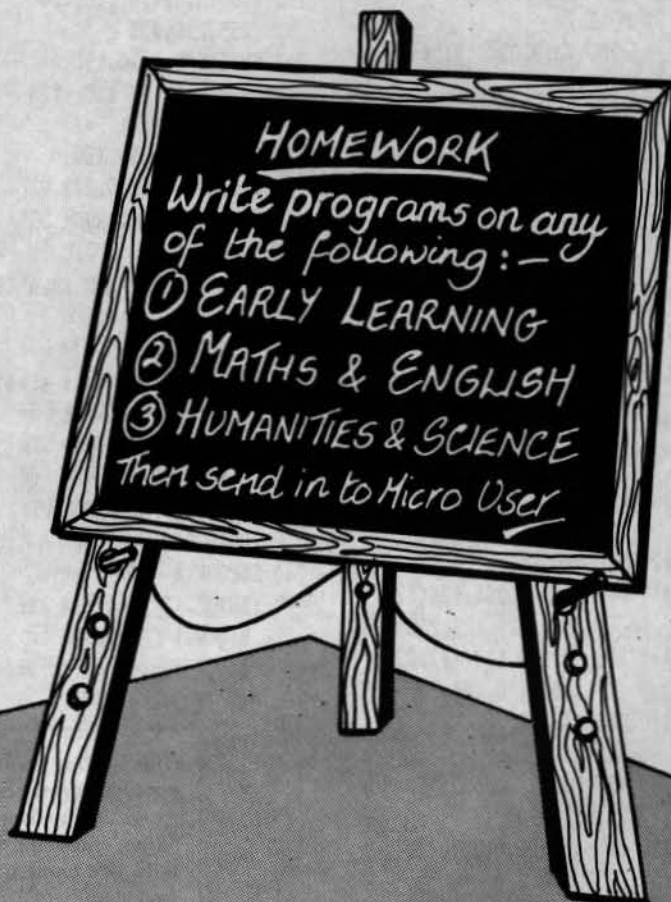
Don't confine your great ideas to your own classroom. Why not share them with your colleagues through the pages of *The Micro User*?

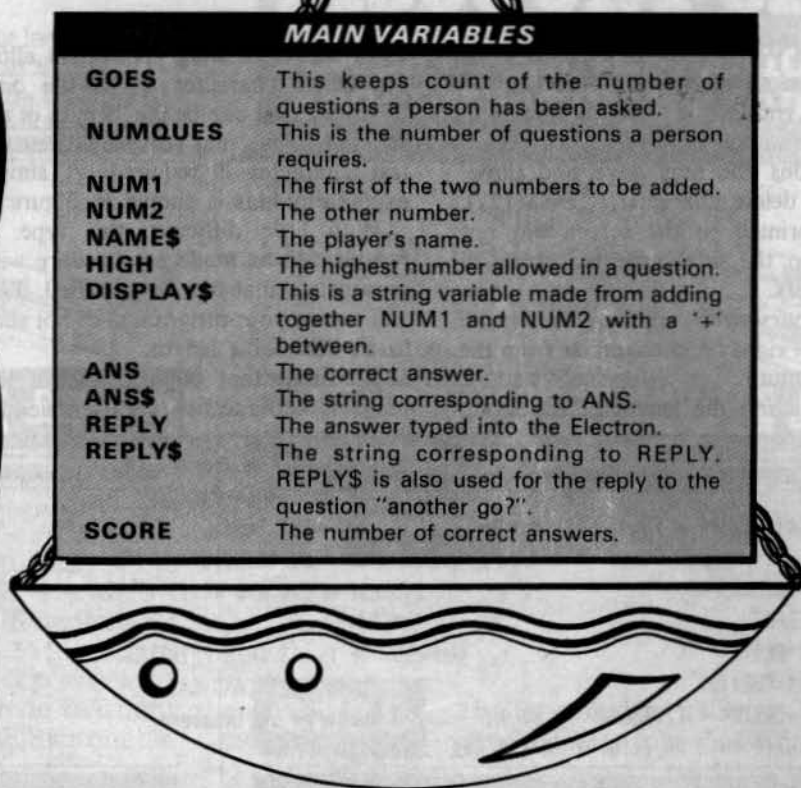
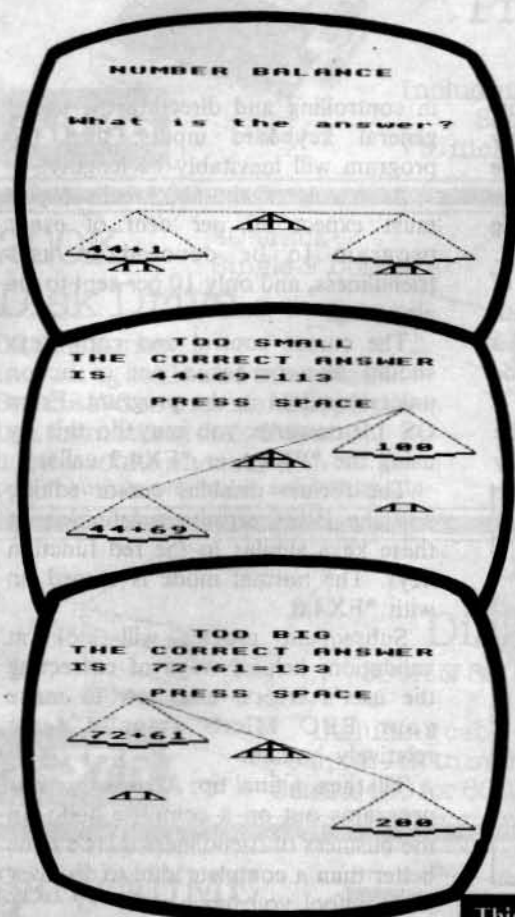
Each month from now on we'll be devoting articles to the use of the BBC Micro in education. As you can see, we've started in this issue with Ian Murray's article on user-friendly software and the excellent number balance program.

And our educational coverage won't be just pious theory - we'll be carrying programs you can try out in your own classroom.

To do all this, we're going to need your help. We need your programs, ideas and opinions. Why not send them to us at:

*Classroom Corner
The Micro User
Europa House
68 Chester Road
Hazel Grove
Stockport SK7 5NY.*





This listing has been taken from our sister publication, *Electron User* — one of the many excellent features appearing in this month's issue.

```
10 REM BALANCE
20 REM (C) Electron User
30 MODE 2
:VDU 23;8202;0;0;0;
40 PROCINIT
50 GOES=0
:REPEAT
:GOES=GOES+1
60 PROCSELECT
70 PROCCENTRE
80 PROCINPUT
90 UNTIL GOES=NUMQUES
100 PROCRESULT
110 IF LEFT$(REPLY$,1)="Y"
OR LEFT$(REPLY$,1)=
"Y"
THEN RUN
ELSE MODE 6
:END
120 DEF PROCINIT
130 VDU 23,230,255,129,129
,129,129,129,129,255
140 VDU 23,229,128,192,224
,176,152,140,134,255
150 VDU 23,228,1,3,7,13
,25,49,97,255
160 VDU 23,227,255,255,0
,0,0,0,0,0
170 VDU 23,226,0,255,255
,255,0,0,0,0
180 VDU 23,225,0,0,0,255
,255,255,0,0
```

```
190 VDU 23,224,0,0,0,0,0
,255,255,255
200 ENVELOPE 1,20,100,0
,0,0,0,0,126,0,0,-126
,126,126
210 ENVELOPE 2,10,128,0
,128,200,0,200,126,0
,0,-126,126,126
220 COLOUR 2
:PRINT " NUMBER BALANCE"
230 VDU 28,0,31,19,1
240 COLOUR 1
:INPUT "How many questi
ons""do you want"
,NUMQUES
250 IF NUMQUES<1
THEN VDU 7
:GOTO 240
260 COLOUR 6
:INPUT "What is the
highest""number in
any""question to be""
*(2 TO 99)",HIGH
```

```
270 IF HIGH<2 OR HIGH>99
THEN VDU 7
:GOTO 260
280 COLOUR 3
:INPUT "What is your
name?" NAME$
290 SCORE=0
300 ENDPROC
310 DEF PROCSELECT
320 NUM1=RND(HIGH)
330 NUM2=RND(HIGH)
340 DISPLAY$=RIGHT$(" "+
STR$(NUM1),2)+"+"+
LEFT$(STR$(NUM2),2)
,2)
350 ANS=NUM1+NUM2
360 ENDPROC
370 DEF PROCPCAN(X,Y,DISPLAY$)
380 COLOUR 5
390 PRINT TAB(X,Y-3)
"
400 PRINT TAB(X,Y-2)
"
```

```
410 PRINT TAB(X,Y-1)
"
420 PRINT TAB(X,Y)
"
430 PRINT TAB(X,Y+1)
"
440 PRINT TAB(X,Y+2) " "+DISPL
AY$+" "
450 COLOUR 6
460 VDU 31,X,Y+3,227,226
,225,224,225,226,227
470 PRINT TAB(X,Y+4)
"
480 MOVE X#64,896-32*Y
:DRAW X#64+223,1055-32*Y
:MOVE X#64+224,1055-32*Y
:DRAW X#64+447,896-32*Y
490 ENDPROC
500 DEF PROCCENTRE
510 CLS
520 PROCPCAN(0,18,DISPLAY$)
:L=480
530 PROCPCAN(13,18," ")
:R=480
540 COLOUR 1
550 VDU 31,9,16,228,229
,10,8,8,8,228,230,230
,229
560 VDU 31,2,22,228,230
,229,31,13,22,228,230
,229
570 MOVE 224,L
```

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July 1983 issue of *The Micro User*.

BALANCE tests your powers of mental arithmetic by giving you a sum to do. The sum appears on one side of a set of scales, and the answer you type in appears on the other.

The pans of the scales balance when the answer is correct, otherwise they tilt.

It's not always easy but it is colourful and fun to play.

It all adds up to a very balanced game

THE PROCEDURES

PROCINIT

This defines the characters, sets up the screen, and initialises NUMQUES, HIGH, NAME\$, and SCORE.

PROCSELECT

Selects two random numbers and calculates DISPLAY\$ and ANS.

PROCPAN(X,Y,Z\$)

Draws a pan at co-ordinates X,Y and puts Z\$ in the pan.

PROC CENTRE

Draws the scales in central position.

PROCINPUT

Takes in your answer and checks it.

PROCBIG

Handles answers that are too big.

PROCSMALL

Handles answers that are too small.

PROCCORRECT

This deals with the correct answers.

PROC MOVE(P)

This moves the scales, the direction depending on whether P is +1 or -1.

PROCRESULT

As might be expected, this procedure prints out the results.

```

: DRAW 1055,R
880 ENDPROC
590 DEF PROCINPUT
600 VDU 7
: COLOUR 3
: PRINT TAB(0,5)"What
  is the answer?"
: COLOUR 5
610 REPLY$=""
: ANS$=STR$(ANS)
: FOR I=1 TO LEN(ANS$)
620 A=GET
: IF A<>13 AND (A<48
  OR A>57)
  THEN 620
  ELSE A$=CHR$(A)
: PRINT TAB(14+I,20)A$
: REPLY$=REPLY$+A$
: NEXT
: REPLY=VAL(REPLY$)
630 REPLY$=LEFT$(" "+REPLY$+
  " ",5)
640 IF ANS=REPLY
  THEN SOUND 0,2,1,50
: PROCCORRECT
650 IF ANS>REPLY
  THEN SOUND 0,1,10,40
: PROCSMALL
660 IF ANS<REPLY
  THEN SOUND 0,1,10,40
: PROCBIG
670 IF GET <>32

```

```

  THEN 670
680 ENDPROC
690 DEF PROCBIG
700 COLOUR 9
: PRINT TAB(6,3)"TOO BIG"
  TAB(0,5)STRING$(19,"
  ")
710 PROC MOVE(-1)
720 COLOUR 10
: PRINT TAB(0,5)"THE CORRE
  CT ANSWER""IS "DISPLAY
  $;"=ANS$;"
: COLOUR 8
: PRINT " PRESS SPACE"
730 ENDPROC
740 DEF PROCSMALL
750 COLOUR 9
: PRINT TAB(5,3)"TOO SMALL
  "TAB(0,5)STRING$(19
  ,")
760 PROC MOVE(1)
770 COLOUR 10
: PRINT TAB(0,5)"THE CORRE
  CT ANSWER""IS "DISPLAY
  $;"=ANS$;"
: COLOUR 8
: PRINT " PRESS SPACE"
780 ENDPROC
790 DEF PROC MOVE(P)
800 YL=18
: YR=18
810 FOR I=1 TO 5

```

```

820 GCOL 3,7
: MOVE 224,L
: DRAW 1055,R
830 YL=YL+P
: YR=YR-P
: L=-1*32*P+L
: R=32*P+R
840 PROCPAN(0,YL,DISPLAY$)
850 PROCPAN(13,YR,REPLY$)
860 GCOL 0,7
: MOVE 224,L
: DRAW 1055,R
870 FOR J=1 TO 500
: NEXT
880 NEXT
890 ENDPROC
900 DEF PROCRESULT
910 VDU 7
: CLS
: COLOUR 3
: PRINT ""RESULTS:-""
  ""
920 COLOUR 6
: PRINT ""You got ";
: COLOUR 1
: PRINT STR$(SCORE)
: COLOUR 6
: PRINT "questions right"
  ""out of the ";
: COLOUR 1
: PRINT STR$(NUMQUES)
: COLOUR 6

```

```

: PRINT ""questions that
  you""tried"
930 COLOUR 10
: PRINT ""Do you want
  another""try? Answer
  yes or""no, then RETURN"
940 INPUT ""REPLY$
: ENDPROC
950 DEF PROCCORRECT
960 SCORE=SCORE+1
970 CLS
: PRINT ""
: FOR I=1 TO 10
: COLOUR RND(15)
: PRINT "WELL DONE ";
: COLOUR RND(15)
: PRINT NAME$
: NEXT
980 PRINT
: FOR I=1 TO 10
: COLOUR RND(15)
: PRINT "YOU ARE RIGHT"
: NEXT
990 COLOUR 7
: PRINT "" PRESS SPACE
  ";
1000 ENDPROC

```

This listing is included in this month's cassette tape offer. See order form on Page 137.

FOR all those machine code junkies out there, here is a shot of code for you to get on with. But for the rest of us I will look at some of the simpler aspects of machine code on the BBC Micro.

You may not realise that your computer, even when it appears to be doing nothing, is actually churning through a very complex set of instructions from the moment you switch it on to the time you switch it off.

It is performing a program called the operating system. This looks after all the operations you take for granted such as seeing if a key has been pressed, writing characters to the screen, and updating the clock.

In fact, it is this program that actually runs the micro. Without it the machine would just sit there doing nothing, not even showing a picture on the screen.

Within the operating system are many other smaller programs designed to perform specific functions. Some of the more useful ones are given names: **OSNEWL** — which is used when you press the Return key.

OSWRCH — which handles all the printing to your TV screen.

OSRDCH — which checks the keyboard for key presses.

OSASCI — which puts a character on the screen, and handles linefeeds.

If you are good at puzzles you may see a connection between the name of the routine and its job. The letters OS always stand for Operating System, but some of the others seem a bit cryptic. **NEWL** is short for **NEWLine**.

ASCI is simply short for **Ascii**, which is the character coding system inside the BBC. It stands for **American Standard Code for Information Interchange**.

Now we get to the hard ones. **RDCH** and **WRCH** are made of two parts, **RD** + **CH** and **WR** + **CH**. These stand for **REad a CHaracter** and **WRite a CHaracter** — all easy once you know.

OSRDCH and **OSWRCH** are the two I want to deal with now.

The first scans the keyboard to see if you have pressed a key. If you have, the computer works out which one and generates the **Ascii** equivalent for it.

This is then placed in one of the

computer's memory slots called the accumulator. This routine also signals your pressing the Escape key.

All of the routines the BBC Micro uses can be called for use in your own routines, by intercepting them and adding your own "patch" program.

To do this you must change the address to which the computer jumps when executing **OSRDCH**. Such an address is called a vector.

Suppose you want to get the **TAB** key to move the cursor eight characters

By PETER WALKER

to the right every time it is pressed.

The first thing that must be done is to save all the computer's internal registers so they cannot be corrupted.

If this is not done the computer might not be able to continue from where it was interrupted, as these hold some important numbers. To save them you **PUSH** these numbers onto the stack by doing this:

PHA — puts the accumulator onto the stack.

TYA:PHA — puts the **Y** register onto the stack.

TXA:PHA — puts the **X** register onto the stack.

These variables are then safe from being corrupted by your program. Also when you have finished your routine these variables must be reloaded back into the machine as follows:

PLA:TAX
PLA:TAY
PLA

Program I shows how it works.

You then have to put this patch program into the operating system. You do it by changing the vector.

The vector for this routine sits at address &210. The contents of this will vary with the operating system you have.

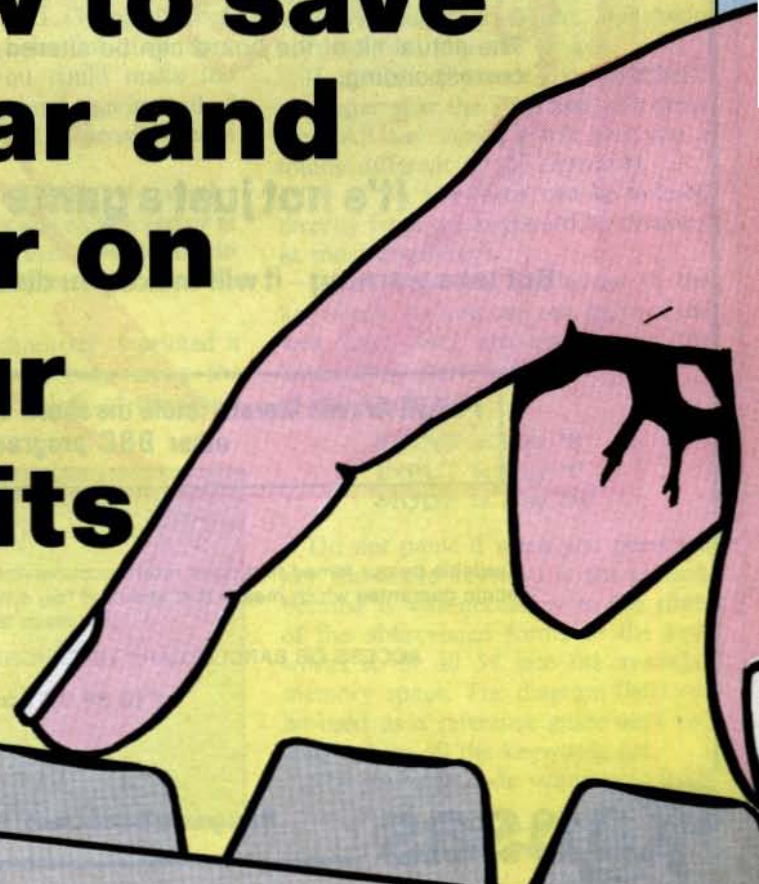
You cannot just overwrite this address, as you need to jump back to it later on in your program. So your own routine must save it.

The address is made of two hexadecimal bytes which are stored in reverse order.

For example, 32768 decimal which equals 8000 hexadecimal is stored as 00(low byte),80(high byte).

If you look at line 50, you will see I have done this in machine code at address &70 and &71. I have also

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From Page 49

```

10 FOR I=0 TO 1
20 PX=1900
30 I
40 OPT I
50 LDA#210
   :STA#70
   :LDA#211
   :STA#71
70 LDA#15
   :STA#210
   :LDA#9
   :STA#211
90 RTS
100 .START
110 STA#80 \Save accumulator.
120 TXA
   :PHA
   :TYA
   :PHA \Save X and Y registers
130 LDA#80
140 CMP#9
   :BNE RT \Test for TAB key.
145 \Lines 150 to 190 Output 8 spaces.
150 LDX#8
   :LDA#32
170 .SS JSR&FFE3
180 DEX
   :CPX#0
   :BNE SS
200 .RT PLA
   :TAY
   :PLA
   :TAX \Restore X and Y registers
210 LDA#80
   :JMP(&70) \Restore accumulator
      and return to original OSRDCH
220 JMP(&70) \Return to original
   OSRDCH
230 I
240 NEXT I
250 END

```

Program I

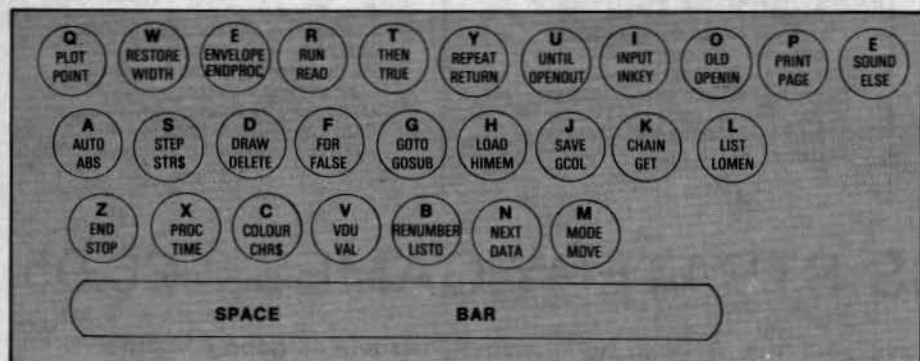


Figure I

changed the vector to the start address of my patch program.

To switch this program on you must type **CALL&0900**, after you have run it. Please note you will see nothing happen, you'll just get your prompt '>' back up.

But if you then press the TAB key you will find that the cursor will jump eight character positions along the screen.

This trivial example illustrates a powerful technique. We use this method in Program II to allow us to enter keywords directly from the keyboard without having to type them – very useful if your typing is not quite up to scratch.

With a bit of imagination and not a lot of knowledge you will be surprised what you can do with OSRDCH.

As with OSRDCH, you must be very careful about saving the registers when using OSWRCH.

When called it takes the Ascii character code in the accumulator and writes its pictorial representation to the TV screen.

All characters output from Basic, the operating system and anything else use this routine. So by using it you could change the action taken by any of the control codes.

For example, CTRL-G rings the bell once. We could make this ring more than once. Or you could make the computer print a pound sign instead of a dollar sign. The list of possibilities is endless.

As before, OSWRCH works through an address stored in a vector at &20E. Program II uses this routine to incorporate a keyboard sounder into the computer.

Every time a character is printed it makes a very short beep using the machine code equivalent of the Basic

sound command. When you press a key it is detected by OSRDCH, which places its code into the accumulator. This is then passed on to OSWRCH which prints the character on the screen and makes a short beep.

At the end of a lot of the lines in Program II you will see program comments. These do not have to be typed in – they just aid you in seeing how the program works.

This will only work on operating systems greater than 0.1, as it uses *FX138, which inserts characters into the keyboard buffer.

Once the program has been typed in and checked, save it so you do not lose it if the machine crashes. To start it just type **CALL&0900** as before, but this time it will return with a beep to tell you it is working.

You should still be able to use the machine normally, except that there will be a small beep each time you press a key.

If this gets on your nerves, don't worry. Just press CTRL @, and this will turn it off. Pressing it again turns the sound back on.

But now for the best bit. If you press the TAB key, then one of the alphabetic keys, a whole word will appear as if by magic on your screen. You will find that all the alphabetic keys do this, plus the @ key.

If, instead of pressing an alphabetic character after the TAB key, you press the TAB key again, it will give you a totally different set of keywords.

In all 54 keywords can be entered directly from the keyboard by pressing at most three keys.

Figure I shows the layout of the keywords. As you can see, most of the well used ones are actually on the letters they start with.

For example:

PRINT = Key 'P'
INPUT = Key 'I'
MODE = Key 'M'

Do not panic if when you press the key the whole keyword is not printed, because it was necessary to use some of the abbreviated forms of the keywords to fit all 54 into the available memory space. The diagram (left) can be used as a reference guide until you learn where all the keywords are.

The machine code sound command

From Page 51

is an option of the OSWORD routine. As you know from Basic, the SOUND command is a very powerful and flexible one and takes the format shown below:

C V P D
SOUND 1, -15, 20, 200

C = Channel Number (1 to 4)
V = Volume (-15 loudest to -1 softest)
P = Pitch (1 to 255)
D = Duration (0 to 255)

In the machine code equivalent you also need this data, which must be put into memory somewhere. The address at which you put this data is pointed to by the X and Y registers, X containing the low byte and Y the high.

All numbers are in hexadecimal, including negative numbers. Each number takes up two locations, so the data will take up eight bytes of memory.

For the example above, the hexadecimal data for this will be:

01, 00, F1, FF, 14, 00, C8, 00

All the two byte numbers are in the

form low byte, high byte. Program III will produce all the notes from 1 to 255 five times in quick succession.

```
10 FOR I=0 TO 1
20 P1=L900
30 I
31 LDA#5
   :STA#70
35 .START
40 LDX#L40
   :LDY#L09
   :LDA#7
   :JSR&FFF1
80 INC#944
   :BNE START
   :DEC#70
   :BNE START
100 RTS
110 ]
120 NEXT I
130 !L0940=LFFF50001
140 !L0944=L00000000
150 END
```

Program III

To call the sound routine, set up the data in memory and set the X and Y registers to the address, for example:

Address = &0A00
X = &00
Y = &0A

Then place the number seven in the accumulator - this is the option number for OSWORD - and CALL address &FFF1.

When using any machine code program such as the keyword program, it always seems pointless to reassemble the program everytime you use it.

A better way would be for it to be executed when it had been loaded. This can be done by *RUNning it. To get this to work first run the program then type:

*SAVE"KEYWORD"900 800 900

If you are going to run this from tape you enter, *RUN"KEYWORD", but if from disc you just type, *KEYWORD.

*KEYWORD is a short form of *RUN"KEYWORD", where "*" means *RUN. Please note, this only works with a disc system.

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Single Key Entry listing

Program II

```

10 REM Copyright The Micro User
20 FOR I=0 TO 1
30 P%=&900
40 [
50 OPT I
60 LDA#&B0
   :STA&72 \Set flag for keyboard
   :sounder test.
70 LDA&20E
   :STA&74 \Save vectors for 'OSWRCH'
   :routine.
80 LDA&20F
   :STA&75
90 LDA#&1C
   :STA&20E \Insert address for
   :new 'OSWRCH' routine.
100 LDA#9
   :STA&20F
110 JSR SDU \Call the keyboard sounde
   :r set up routine.
120 RTS
130 .START
140 STA&70
   :TXA
   :PHA
   :TYA
   :PHA \Save all registers A,X
   :Y.
150 LDA&70
   :CMP#9
   :BEQ KK
   :CMP#0
   :BEQ QQ
   :BNE EE \Test for TAB key and
   :CTRL '@'
160 .KK JSR KE
   :CMP#9
   :BNE YY
   :JSR KE
   :SBC#37
   :JMP ZZ \Get second key press.
170 .YY SBC#64
   :ZZ BMI KK
   :TAY
   :LDA&9C0,Y
   :TAY \Calculate offset table
   :value.
180 .LD LDA&A00,Y
   :CMP#64
   :BEQ EN
   :STY&71 \Get character from
   :keyword table.
190 LDX#0
   :TAY

```

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July issue of The Micro User.

```

   :LDA#&BA
   :JSR&FFF4
   :LDY&71
   :INY
   :BNE LD \Put chr into keybrd
   :buffer.
200 .QQ LDA&72
   :EOR #&80
   :STA&72
   :JMP EE \Change flag for keyboard
   :sounder.
210 .EE PLA
   :TAY
   :PLA
   :TAX
   :LDA&70
   :JMP(&74) \Restore all registers
   :A,X,Y.
220 .EN PLA
   :TAY
   :PLA
   :TAX
   :RTS \Restore registers X,Y.Return
   :n from subroutine.
230 .KE JSR&FFE0
   :CMP#9
   :BEQ KZ \Get key and test for
   :TAB key pressed.
240 CMP#91
   :BCS KE
   :CMP#64
   :BCC KE
   :.KZ RTS \Perform range check
   :64<=CHR<91.
250 .SDU LDA&210
   :STA&76 \Save vector for 'OSRDCH'
260 LDA&211
   :STA&77
270 LDA#&98
   :STA&210 \Set address for new
   :'OSRDCH' routine.
280 LDA#09
   :STA&211

```

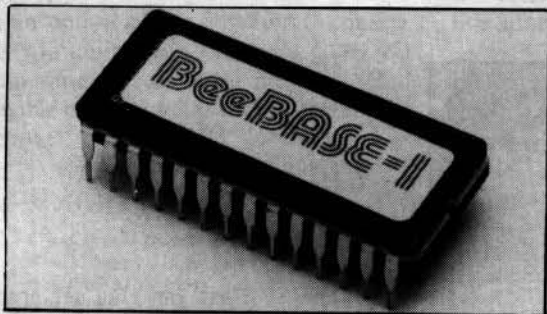
```

290 RTS
300 TXA
   :PHA
   :TYA
   :PHA \Save registers X,Y.
310 LDA&72
   :CMP#&80
   :BNE SD \Test for flag set,branch
   :to end if not.
320 LDX#&B4 \Set address for data
   :for M/C sound routine.
330 LDY#&09
340 LDA#7 \Set function for 'OSWORD'.
350 JSR&FFF1 \Call 'OSWORD' routine.
360 .SD PLA
   :TAY
   :PLA
   :TAX \Restore registers X,Y.
370 JMP(&76) \Return to original
   :'OSRDCH' routine.
380 J
390 NEXT I
400 REM Data for sound routine from
   :'OSWORD'.
410 !&09B4=&FFF50001
420 !&09BB=&00010050
430 REM Puts data for program into
   :memory,keywords at &0A00,Table
   :at &09C0.
440 READ A$,B$
450 $A00=A$+B$
460 MEM=&9C0
470 FOR I=1 TO 54
480 READ A
   :?MEM=A
490 MEM=MEM+1
500 NEXT I
510 END
520 REM Data for keyword table and
   :offset table.
530 DATA SDU.@AUTO@REN.@COLOUR@DRAW@E
   :NV.@FOR@G.@LOAD@INPUT@SAVE@CH.@LI
   :ST@MODE@NEXT@DLDEP.@PLOT@RUN@STEP
   :@THEN@U.@VDU@RES.@PROC@REP.@END@
540 DATA ELSE@ABS@LIST@CHR#@DEL.@E.@
   :FA.@GOS.@H.@INKEY@GCOL@GET@LOM.@M
   :OVE@DATA@OP.@PA.@POINT@READ@STR#@
   :TRUE@QPEND.@VAL@W.@TIME@R.@STOP@
550 DATA 0,5,10,15,22,27,32,36,39
   :44,50,55,59,64,69,74,78,81
   :86,90,95,100,103,107,112,117
   :122,126,131,135,141,146,151
   :154,158,163,166,172,177,181
   :186,191,196,200,204,210,215
   :220,225,232,236,239,244,247
   :252

```

This listing is included in this month's cassette tape offer. See order form on Page 137.

Ultra-fast BeeBASE -



**A machine code
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What would YOU do with a Beasty?

Tell us and you could WIN this exciting robotics interface

Speech synthesiser contest winners

WINNERS of the November speech synthesiser contest were J.C. Copley of Farnborough, John Todman of Welwyn Garden City and Richard Trout of Oldham. We've not room to

give all the listings so we've tossed some coins and decided to list Mr Copley's demonstration of recursion. Its excellent graphics more than make the point.

```

10 MODE1
20 PROCinit
30 PROCpic(0,0,1)
40 END
50 DEF PROCpic(XZ,YZ,S)
60 IF S<0.005 THEN ENDPROC
70 T=TIME:REPEAT:UNTIL TIME>T+100
80 VDU 29,XZ,YZ;
90 FOR IX=1TON:PROCsp(IX,S):NEXT IX
100 XZ=XZ+U(21)*S:YZ=YZ+V(21)*S
110 PROCpic(XZ,YZ,S*RATIO):ENDPROC
120 DEF PROCsp(IX,S)
130 GCOL 0,C(IX):DRAW U(IX)*S,V(IX)*
140 ENDPROC
150 DEF PROCinit
160 N=25:DIM C(N),U(N),V(N)
170 FORI=1TON:READC(I),U(I),V(I):NEX
TI
180 RATIO=(U(22)-U(21))/1280:ENDPROC
190 DATA 0,50,100,1,120,420,1,190,10
0,1,120,420,1,120,600,1,80,700,1,160,7
00,1,120,600,1,120,580,1,50,350,1,120,
580,1,210,550,1,300,600,0,1040,100,2,1
007,200
200 DATA 0,767,920,2,750,970,2,733,9
20,0,493,200,2,460,100,0,300,200,3,120
0,200,3,1200,920,3,300,920,3,300,200

```

THIS month's competition is based around Commotion's Beasty, the interface that makes robotics a real possibility for the computer hobbyist.

Beasty allows you to control up to four servos from your BBC Micro, without the need for complicated programming.

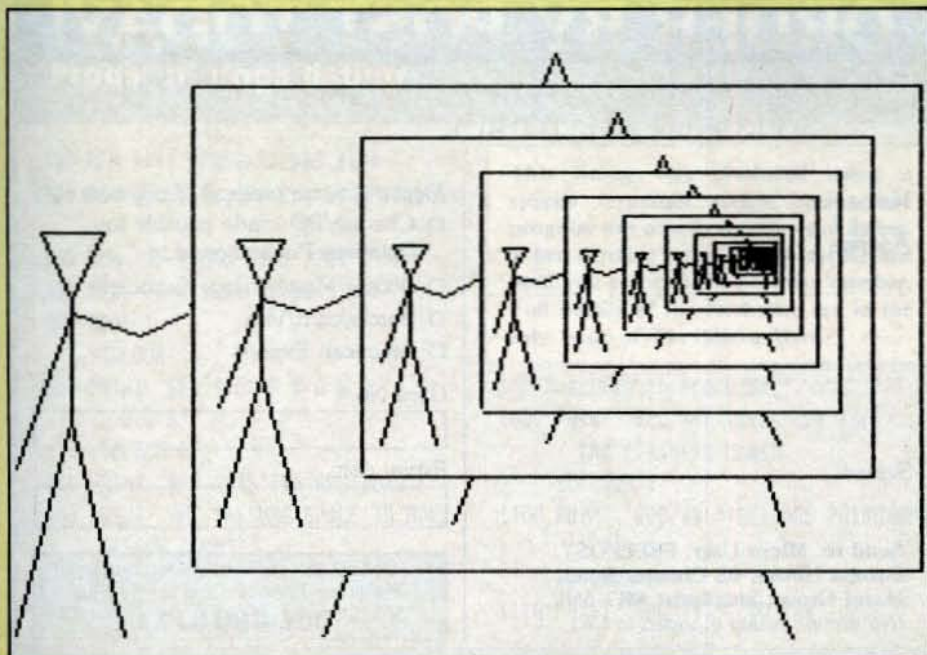
Servos are the precision electric motors that give "muscle" to your micro, enabling you to translate your ideas into physical movement.

By combining Beasty with children's construction kits, BBC Micro users have managed to create a variety of robots and computer controlled mechanical devices, one of which you can see in the photo. There's even a computer-controlled cat door based on the Beasty!

All you have to do for this month's competition is to describe how you would use a Beasty. Not more than 500 words, please, but you can send a couple of diagrams if you wish.

The most original and practical idea will be the winner - the prize, of course, being the Beasty together with a pair of servos.

Send your entry, together with the coupon below, to reach us no later than February 29.



BEASTY CONTEST

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Send this coupon together with your entry to:

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 Europa House, 68 Chester Road,
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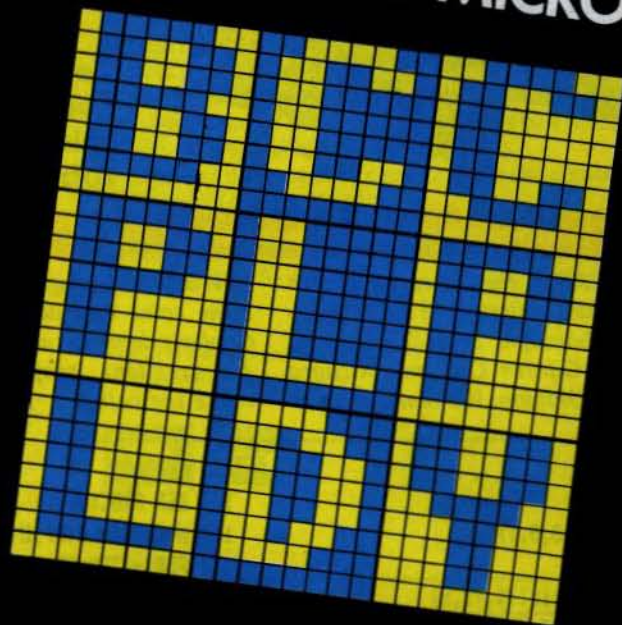
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It's simple but it's fun, so
hop to it and play this
compulsive game

Frogs 'n' Dogs

By
SHARON KING
PAUL KING
and
DENNIS IBBOTSON



FROGS 'n' Dogs is probably one of the most compulsive games we've ever published. It's not the fastest game we've ever played, or the most ingenious – it's quite simply the most enjoyable.

The idea comes from eight and a half year old Sharon King, and her younger brother Paul, aged six and a half.

We published their letter describing

the game in our December 1983 Micromail, asking for programmers to take up the challenge.

Dennis Ibbotson, the man who programmed the DACC Sprite Generator, came to the rescue with this fun-packed interpretation of their idea.

So, Sharon and Paul, here's your game.

All you have to do is to use the space bar to jump over Fido the dog and the occasional poisonous lily pad – they're the flashing ones.

The longer you survive, the more points you get.

Get more than 500 and you move onto a more difficult sheet.

Good luck!

Frogs 'n' dogs listing

```
100 REM **** FROGS/N/DOGS ****
200 REM By S.King,P.King & D.H.Ibbots
   on
300 REM (C) MICRO USER 1984
400 REM ----- instructions -----
500 MODE 1
   :COLOUR 1
600 PRINT 'SPC (10)"F R O G S 'N'
   D O G S"
   :COLOUR 3
700 PRINT 'SPC (14)"INSTRUCTIONS"
800 PRINT 'SPC (6)"USE SPACE TO MAKE
   FREDDY JUMP"'
   :COLOUR 2
900 PRINT 'SPC (4)"Stay near the
```

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July issue of The Micro User.

```
   lilies to score but"
1000 PRINT 'SPC (4)"watch out for
   the flashing ones"
   :COLOUR 1
1100 PRINT 'SPC (9)"THEY ARE POISONOUS
   !!!"
   :COLOUR 2
1110 PRINT 'SPC (6)"FIDO the local
```

```
   Spaniel often"
1120 PRINT 'SPC (6)"strolls along
   the shallow"
1130 PRINT 'SPC (14)"lily ponds"
   :COLOUR 1
1140 PRINT 'SPC (8)"SNAPPING UP YOUNG
   FROGS"
1150 PRINT 'SPC (0)"TAKE CARE - IT'S
   NOT AS EASY AS IT LOOKS"'
   :COLOUR 3
   :#FX15
1200 FOR del=0 TO 4000
   :NEXT
```


MRM SOFTWARE

Britain's newest software house.

DIAMOND MINE

Can you lay a pipeline to the diamonds without hitting the walls or having your pipes eaten by the bugs. You'll need a steady hand and perfect timing for the game.

Q Man No. 1 on Micronet Top Ten
Banana Man No. 4 (new entry)
Q Man's Brother No. 6 (new entry)

FOR THE BBC 32K

BBC MICRO SHOW

M.R.M's Software was without doubt the hit of the show. Order your game now and you won't be disappointed.

Previously only available on Micronet 800 - now by popular demand available direct to the public.

Q-MAN



The very popular 3D pyramid game. Hop around the pyramid avoiding the bouncing balls and Jake the Snake. A highly entertaining game with increasing difficulty plus our own totally unique features. Game includes TRANSPORT DISCS, BONUS, HIGH-SCORE TABLE, HYPERSPACE and SMART BOMBS. Excellent graphics and terrific sound. One of the three top selling games on MICRONET this month.

Q-MAN'S BROTHER



Q-MAN'S BROTHER is featured in the high score table of Q-MAN and now has his very own game. Have you time to paint all of the maze? Not if the PAINT POTS have anything to do with it or especially the deadly PAINT ROLLER which will erase all of your hard work! Increasing difficulty, excellent sound, AMAZING 3D graphics and high score.

BANANA MAN



A totally new concept from MRM. You are the BANANA MAN and you must eat 40 BANANA SANDWICHES each minute to stay alive. There are BLUE BLOCKS which may prevent you from reaching the food and deadly PURPLE TARANTULAS that are fatal if stepped upon. ETHEL the CAT also appears but can be scared away for mystery points. But watch out, she conceals a spider. Features include BONUS BANANAS, BLOCK 'SHUFFLE', INCREASING DIFFICULTY, HIGH-SCORE TABLE and GREAT GRAPHICS.

GUY IN THE HAT



You are THE GUY IN THE HAT entombed in a honeycomb labyrinth. Like BANANA MAN you have an increasing daily food diet, but this time your favourite snack is a BICKIE. Beware of the pursuing BICKIE BASHERS that are trying to ensnare you. Gain extra points by dropping your exploding hat and trapping the BICKIE BASHERS. Movement in 6 directions, HYPERLEAP and menacing sounds are included along with the usual great graphics and high-score table.

SECRET SAM SERIES



Two great original adventure games from MRM. Written in plain English on a spy based theme. Travel around meeting AGENTS, collecting CLUES and ITEMS that will aid you in your mission. SAM1 and SAM2 are completely separate missions and each game is a thoroughly enjoyable adventure in its own right. Many hours of frustrating fun plus sound effects.

3D MUNCHY



A visually stunning version of the now legendary arcade classic ... with a difference. Eat power pellets whilst avoiding the GHOSTS as usual, but can you get past the HOLES? Absolutely amazing graphics and sounds, increasing difficulty and high score. All this and you're battling against the clock as well. A CLASSIC from MRM.

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From Page 57

```

:PRINT SPC (13)*PRESS ANY KEY"
1300 IF GET
1400 REM --- initial settings ---
1500 VDU &F017;0;&4575;&4565;&45;&F117
    ;0;&5488;&5454;&88; &F217;0;0;&FF
    00;&7E; &F317;&0406;&FF07;&7C7C;&
    6644; &F417;&42;&81FF;&66FF;&E724;
1600 *FX9,5
1700 *FX10,5
1800 AZ=RND(-TIME)
    :AS=STRING$(19," ")
1900 EX=8
    :fz=4
    :lz=4
    :SZ=0
    :TX=0
    :UX=500
    :VX=0
2000 DIM AZ(3)
    :AZ(1)=96
    :AZ(2)=384
    :AZ(3)=672
2100 REM --- end of initialising
    start of main program ----
2200 AZ=2000
    :BZ=2000
    :CX=0
    :DX=96
    :GX=2000
    :HX=2000
    :IX=1200
    :JZ=672
    :FX=1
2300 MODE 2.
    :VDU 23;8202;0;0;0;19,15,5;0;
    :PRINT " " FROGS'N'DOGS"
    :COLOUR 1
    :PRINT "SCORE          FROGS"
    :COLOUR 7
    :COLOUR 132
    :FOR Z=0 TO 2
    :PRINT TAB(0,Z*9+12)A$
    :NEXT
    :COLOUR 143
    :PRINT TAB(0,28)CHR$ 240CHR$ 241
    TAB(0,29)" "
    :COLOUR 128
2400 PROCililys(7+VZ)
    :PROCfogs
2500 REM ----- MAIN LOOP -----
2600 REM next line draws the frog
    & dog
2700 REPEAT

```

```

:GCOL 3,2
:MOVE GX,HZ
:VDU 244
:MOVE IX,JZ
:VDU 244
:GX=IX
:HX=JZ
:GCOL 3,15
:MOVE AZ,BZ
:VDU 243
:MOVE CX,DX
:VDU 243
:AZ=CX
:BZ=DX
2800 IF CX<IX IF CX+64>IX IF DX<JZ+32
    IF DX>JZ-32PROCd
    :GOTO 2100
2900 IF CX>1100PROCe
3000 QZ=POINT(IX+24,JZ-28)
    :IF QZ<8TX=TX+QZ
    ELSE PROCd
    :GOTO 2100
3100 IF QZSOUND &13,-12,100+QZ*16
    ,3
3200 IF TX>100PROCf
    :IF SZ=UXPROCu
    :GOTO 2100
3300 IF FZ IF INKEY -99PROCj
3400 IF FZ=0JZ=JZ+KZ
    :KZ=KZ-4
    :IF KZ=-34FZ=1
3500 CX=CX+RND(EX)
    :TX=TX-16
    :IF IX<0IX=1200
    :JZ=AZ(RND(3))
    :FX=1
3600 UNTIL fz=0
    :*FX15
3700 REM ----- END OF MAIN LOOP -----
3800 VDU 4
    :COLOUR 7
    :PRINT TAB(2,16)"PRESS Y TO PLAY"
    :REPEAT UNTIL GET$ ="Y"OR
    GET$ ="y"
    :RUN
3900 REM ----- end of main program
    ----
4000 DEF PROCj SOUND &10,-15,5,2
    :SOUND 1,-15,0,3
    :FZ=0
    :KZ=30
    :ENDPROC
4100 DEF PROCe CX=0
    :EX=EX+2

```



```

:DX=AZ(RND(3))
:ENDPROC
4200 DEF PROCf SZ=SZ+100
    :PROCscore
    :TX=0
    :ENDPROC
4300 DEF PROCd fz=fz-1
    :FOR Z=-15 TO 0
    :SOUND 0,Z,6,4
    :NEXT
    :PROCfogs
    :ENDPROC
4400 ENDPROC
4500 DEF PROCu FOR Z=100 TO 200
    STEP 4
    :SOUND 2,-15,2,2
    :NEXT
    :UX=UX+500
    :PROCup_level
    :ENDPROC
4600 DEF PROCup_level IF VX<6VZ=VZ+1
4700 ENDPROC
4800 DEF PROCscore VDU 4
    :COLOUR 6
    :PRINT TAB(5,3);SZ
    :VDU 5
    :ENDPROC
4900 DEF PROCfogs COLOUR 2
    :PRINT TAB(13,3);fz
    :PROCscore
    :ENDPROC
5000 DEF PROCililys(BZ)FOR WZ=0
    TO 4
    :FOR Z=0 TO 2
    :COLOUR RND(BZ)
    :PRINT TAB(3+WZ*3,Z*9+11)
    CHR$ 242
    :NEXT
    :COLOUR 1
    :PRINT TAB(3,29)CHR$ 242
    :ENDPROC

```

This listing is included in this month's cassette tape offer. See order form on Page 137.

The BBC Sideways RAM System

The BBC Sideways RAM:

The most exciting add-on for the BBC micro, which many have been waiting for Acorn to produce!

Neater, more reliable and far more economical than plugging in more ROMs into your BBC!

What is the Sideways RAM?

The sideways RAM is a 16K (upgradable to 128K) memory board which fits into the rightmost ROM socket on your BBC micro. The sideways RAM is an essential piece of hardware for any BBC computer. Strategically integrated into the BBC system, the system is capable of:

Running Any Languages, Wordprocessor, Electronic Spreadsheet:

The sideways RAM allows you to run any software normally available in ROM such as WORDWISE, VIEW, BEEBCALC, BASIC2, FORTH, PASCAL, BCPL, EXMON, DISK DOCTOR, NET FILING SYSTEM, ENHANCED 16K DISK FILING SYSTEM, SPEECH ROM etc. . . . These programs can be saved on disk or tape and loaded later in seconds into the sideways RAM.

Giving 27K Bytes Free with Acorn Disk Filing System:

The sideways RAM can also be used to increase available memory for BASIC, BEEBCALC, WORDWISE, VIEW etc. by moving disk workspace into sideways RAM. PAGE is then set to the lowest possible value, i.e. &OE00.

Creating and Maintaining a Silicon Disk on your Computer:

If you have 128K of sideways RAM, 112K of it can be turned into a silicon disk. The system will address your floppy disk as drive 0 and the silicon disk as drive 1 but with a difference! The silicon drive has the capacity to load a 32K program faster than you can remove your finger from the 'RETURN' key with no clicking noise, no on/off LED, no wear. It can make you a backup floppy in 15 seconds from the original. The sheer speed of sideways RAM makes 3D-graphic look like a movie picture. It's life in the fast lane!

Free Software with Every Sideways RAM System:

The Sideways RAM comes complete with lots of free software, now and with future updates. The free software includes "ROMCOPY" to move sideways ROMs to disc (or tape), STL0E00 to move disk filing system workspace into sideways RAM thus giving 3K bytes extra memory to BASIC, WORDWISE, VIEW, BEEBCALC, etc., STLDISC to create and maintain a SILICON DISK on your system with extra disk facilities and demonstration programs.

Future releases include our own DFS (JAN. 84) and SILICON 100K DISK BASIC (MARCH 84). All sideways RAM system software is given in basic source code. Users are encouraged to personalise and benevolent contributors will be rewarded with free hardware gifts.

Increase the Computer Power by Increasing Sideways RAM:

The BBC comes with 32K of RAM and has access to a maximum of 3 languages. The BBC with 16K sideways RAM has 48K of RAM and has access to a wealth of languages. The BBC with 32K sideways RAM can run 2 loaded languages at the same time. The BBC with 128K sideways RAM can run 8 loaded languages at the same time. The power of the BBC relies on its intelligent use of software where several sideways ROMs execute different tasks such as filing, processing, debugging etc. The bigger the sideways RAM, the bigger the task the computer can handle.

The sideways RAM is such a powerful and promising device that ACORN HAS PLANNED to release a similar system on the ELECTRON.

Rather than being a software piracy aid, the Sideways RAM system is the key solution to selling more software to BBC computer users. This is because powerful sideways software can be shared by users of the same network and sold cheaper on tape, disk or by electronic mail.

Beautifully Designed, Easily Installed, no Soldering Required:

The sideways RAM was first introduced and the first issue sold out at the ACORN USER SHOW (Sept. 83, London). The new issue has been exhibited at the PCW SHOW (Oct/Nov. 83, London) and will be on general distribution release at the BBC USER SHOW (Dec. 83, Westminster, London). The system can be installed in 2 minutes by yourself or most BBC dealers and requires no soldering.

HERE IS HOW:
Open the computer case, plug into the rightmost sideways ROM socket the cartridge base unit (see picture 1). Install your sideways ROMs, one at a time, onto the mini ROM cartridge (see figure 2), insert the cartridge into the base unit and CHAIN "ROMCOPY". This program will save your sideways ROM on disk or tape. Locate S20 and S22 jumper blocks on the computer board. Replace the jumpers with control wires from the base unit. Install the sideways RAM card in place of the mini ROM cartridge. Switch on the computer and "LOAD any program saved with "ROMCOPY". Press the BREAK key. Call up your sideways software as usual. For example, "WORD etc.
Further upgrading to 32K or to 128K is very simple: from 16K to 32K is by straight exchange (cost: £12+p&p), from 32K to 128K is by plugging in the SOLIDISK extension (see figure 3) onto the 32K sideways RAM. It costs just £76 plus p&p.

OTHER PERIPHERALS FOR THE BBC MICRO:

We are stockists of the EPSON range of PRINTERS, the SANYO range of COLOUR MONITORS, disk drives from various manufacturers and floppy diskettes (WABBASH, VERBATIM, DATALIFE, DYSAN etc.). Ring us for a quotation.

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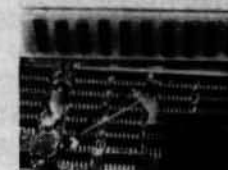


INSTALLING THE CARTRIDGE BASE



USING THE ROM CARTRIDGE TO TRANSFER SOFTWARE ON DISK

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SOLIDISK extension alone for BBC-32K Side Way Ram, if bought separately:			£76.00
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Please charge my Access, Barclay account:			TOTAL £
NAME			
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*Please delete complete as applicable
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SOLIDISK TECHNOLOGY LTD
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THE Editor came up to my desk smirking. "I need your help with a program I've written. It's called Expenses. You type your expenses claim into the micro and it comes back with 'Not allowed, go away'."

"I want you to make the program make a rude noise". He turned, and made it into the office on his third attempt.

SO far, we've covered the production of notes on the BBC Micro using the SOUND command, and learned about the sound channels and how to flush them.

This month we'll be covering the problems of getting two or more notes to sound at the same time. This means synchronising the notes on different channels. Try out Program I.

```
10 REM PROGRAM I
20 SOUND 1,-15,60,20
30 SOUND 2,-15,76,20
40 SOUND 3,-15,88,20
```

This plays three notes at the same time. This is called a chord. If it sounds nasty, then it's a discord.

Peters' First Law states that it is much easier to produce discords than harmonious chords!

I doubt if anyone has ears sharp enough to tell, but, because it takes time for the micro to interpret a line of Basic, the second and third notes start a split second after each other.

Since they have the same duration, this means they will end in a ragged manner, first note one, then note two, then note three.

Program II has a couple of delay loops in it to accentuate this effect.

```
10 REM PROGRAM II
20 SOUND 1,-15,60,20
30 FOR N=1 TO 1000:NEXT N
40 SOUND 2,-15,76,20
50 FOR N=1 TO 1000:NEXT N
60 SOUND 3,-15,88,20
```

This is supposed to lessen the clarity of chords, though how anyone can tell beats me! Still, BBC Basic has a way to overcome this undetectable effect.

It's not as pointless as you might think, as it also comes in useful when you're writing tunes for the micro, helping you make sure that the right notes are played at the right time.

From my last article you'll remember that the channel parameter can be

treated as a four digit hexadecimal number &TUVW.

W was the channel number with values of 0, 1, 2 or 3 while V was the flushing control which was set to 1 to clear a channel's sound queue.

T we ignored, and will continue to do so until we get to the ENVELOPE command. It's the U parameter that decides how notes are synchronised.

If you think about it then you'll realise that for two or more notes to play at the same time each must be on a separate channel.

The U parameter in a SOUND command tells the micro that it is not to play that note until there is a certain number of other channels with notes.

When the required number of channels containing notes is reached then all of them start playing at the same time. The value of U decides how many other channels must have notes before the chord is played.

If U is 0, then the micro plays the note when it can, without reference to other channels. If it is 1, the micro will hold that note until there is another note available on another channel.

If it is 2, it will wait until two other notes are available, that is all three notes will start simultaneously. If it is 3, it will wait for three other notes when all four of the micro's channels will be in use. The values are shown in Figure I.

Try Program III to see it in action.

```
10 REM PROGRAM III
20 SOUND &0201,-15,60,40
30 FOR N=1 TO 1000:NEXT N
40 SOUND &0202,-15,76,40
50 FOR N=1 TO 1000:NEXT N
60 SOUND &0203,-15,88,40
```

Sorting out the chords from the discords

U Parameter	Effect	Note in chord
0	Plays without reference to other channels	1
1	Waits for note on one other channel	2
2	Waits for notes on two other channels	3
3	Waits for notes on all channels	4

Figure I: Synchronisation parameter values

What happens is that the micro reads the first SOUND statement and, because it has 2 in the U parameter, it waits for two notes to be available on other channels. When it has these it plays all three notes together.

The delay loops make for a slight pause before the chord is played. This shows that the micro really is waiting for the other two notes.

Since the duration parameters are the same, the notes all stop playing at the same time. If this weren't the case there would be a ragged ending. Setting the U parameter only synchronises the start of the notes.

Can you figure out why nothing seems to happen when you run Program IV?

```
10 REM PROGRAM IV
20 SOUND &0301,-15,60,40
30 SOUND &0302,-15,76,40
40 SOUND &0303,-15,88,40
```

Don't think your computer has gone wrong! What happens is that the micro

From Page 61

reads the U parameter of the first SOUND statement. As this is 3 it will not play that note until sounds are available from three other channels. Unfortunately the program only gives two other notes so the micro can't play. Hence the silence!

However, the notes in the channel don't just disappear. They are still in the queues waiting for a note on the fourth channel. Give them one by entering:

```
SOUND &0300,-15,88,40
```

and pressing Return. Now that the fourth channel has a note, all four will sound.

Before you run the other programs in this article, it would be wise to press Escape to clear the sound queues of any left-over notes. If you don't, you might get some strange results. You have been warned!

One point to bear in mind is that when the micro comes across a U parameter that makes it search the channels for other notes, it will quite happily accept ones that are already playing. Try Program V:

```
10 REM PROGRAM V
20 SOUND &0101,-15,60,40
30 SOUND &0102,-15,76,40
40 SOUND &0203,-15,88,40
50 SOUND &0200,-15,88,40
```

At first glance you might think it will play the first two notes as the U parameter ties them together. Then it

will hang up as the next two notes have a U parameter of 2 and need a third before they can sound.

Playing the program will soon show you that this isn't so, as all four notes are played at once.

This is because the micro comes to the last two SOUND statements and starts searching the other channels for a note.

Since they're already playing notes and carry a U parameter, it will quite happily accept either of them to make up the third note. And so the U parameter's condition is fulfilled and the note plays.

However, if we put in a line of Basic, as in Program VI, you'll notice that only the first two notes are played and that the third and fourth are left in the queues.

```
5 REM PROGRAM VI
10 SOUND &0101,-15,60,40
20 SOUND &0102,-15,76,40
25 FOR N=1 TO 4000:NEXT N
30 SOUND &0203,-15,88,40
40 SOUND &0200,-15,88,40
```

Enter one of the sound commands from the first two notes and you'll hear these left-over sounds along with the one you've entered.

Remember if you're getting funny effects it's probably because you've got some notes left in the queues. Get rid of them with Escape.

Finally, Program VII combines the synchronisation parameter U with the

```
10 REM PROGRAM VII
20 SOUND &0201,-15,52,254
30 SOUND &0202,-15,68,254
40 SOUND &0203,-15,80,254
50 PRINT"Press key for next chord"
60 pause$=GET$
70 SOUND &0211,-15,60,254
80 SOUND &0212,-15,76,254
90 SOUND &0213,-15,88,254
100 PRINT"Press key for next chord"

110 pause$=GET$
120 SOUND &0211,-15,68,254
130 SOUND &0212,-15,84,254
140 SOUND &0213,-15,96,254
150 PRINT"Press key to end"
160 pause$=GET$
170 SOUND &0211,0,0,0
180 SOUND &0212,0,0,0
190 SOUND &0213,0,0,0
```

flushing parameter V, which we covered in the last article.

This allows us to play three chords in succession by pressing the key.

Notice that the final SOUND statements which flush the chords are synchronised to prevent a ragged ending, though I don't know who would be able to tell if they weren't!

Anyway, this is where I finish. The next article will cover the sound effects channel, which I've just been using in the editor's expenses program. I did it in my own time and sent him a bill. He made a rude noise.

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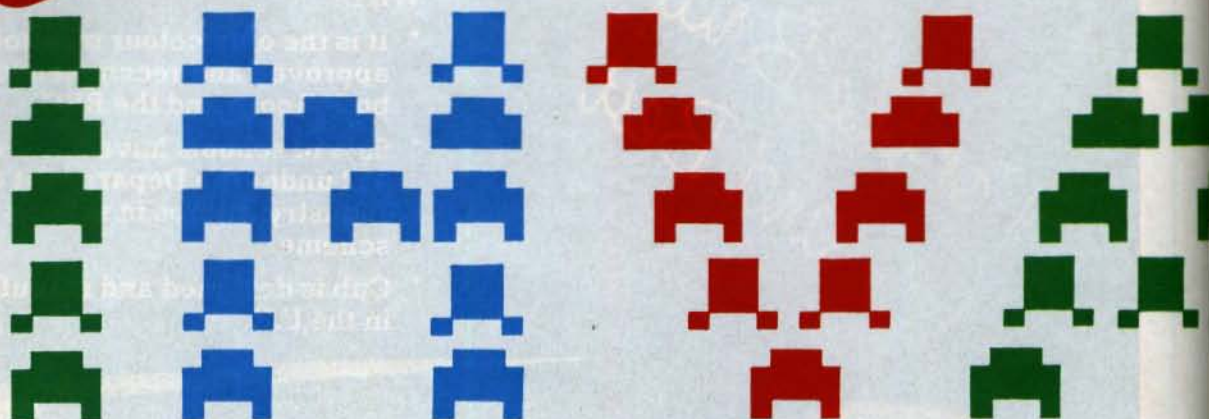
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Who said you can't write a good Invaders

Alien



AT last, an authentic game of Invaders to run on both the Model A and B micros. In good arcade style, there are five colourful and ever advancing rows of Aliens, 10 per row, mercilessly bombing you.

You get 1,000 points for each full wave you destroy, but you've only got three lives, and each new wave starts lower and comes faster.

The mothership appears randomly, taunting you with her song, but if you can hit her, she's worth up to 300 points.

With a choice of either joysticks or keyboard, the game should provide hours of enjoyment, and a chance to admire the wonders of BBC Basic and Teletext Mode 7.

The program is written almost entirely in "straight" Basic, with the exception of the bomb routines, which for the sake of speed, use the BBC "?" peeks and pokes.

Before discussing the details of the program, let's consider Mode 7. The program runs in less than 10,000 bytes and that includes the graphics.

Although the shapes are limited and chunky, they are very likeable, much in the same vein as the Ceefax and Oracle screens on TV.

In simple terms, to the Basic

interpreter the shapes are no more than concatenated (joined together) characters, printed in the same way as the normal Ascii set - ABC, etc.

The difference is achieved by use of the control codes - see Figure 1.

The code must be printed before the required shape - but on the same line - using the CHR\$() instruction, or alternatively, using the VDU instruction. For example:

```
PRINTCHR$(91)
```

```
VDU145
```

will both provide for red graphics on the rest of the line. Each line of print requires its own control code - try Program 1:

```
10MODE7:FOR A=2 TO 24 STEP 2
20PRINT TAB(0,A)CHR$(91)
30NEXT
40FOR A=1 TO 24
50PRINTTAB(A,A)"x{xt"
60NEXT
```

Program 1

As you can see, the first loop places the control code in alternate lines, resulting in a mothership (borrowed from the game) on one line and gobbledygook on the next.

What about gobbledygook? Can we

use it selectively? The answer is yes, and is explained in Table I.

In the User Guide (page 155) the "six cell" graphics characters are explained as Ascii values. I use the table, which provides both a quick look-up method and an easier line to enter.

The User Guide would have you calculate and enter:

```
PRINT CHR$(91); CHR$(248);
CHR$(251); CHR$(247); CHR$(244)
```

or:
VDU145,248,251,247,244
to print a mothership, but by the table method:

Decimal	-145 - Hex	&91	producing red	graphics
146		&92	green	"
147		&93	yellow	"
148		&94	blue	"
149		&95	magenta	"
150		&96	cyan	"
151		&97	white	"

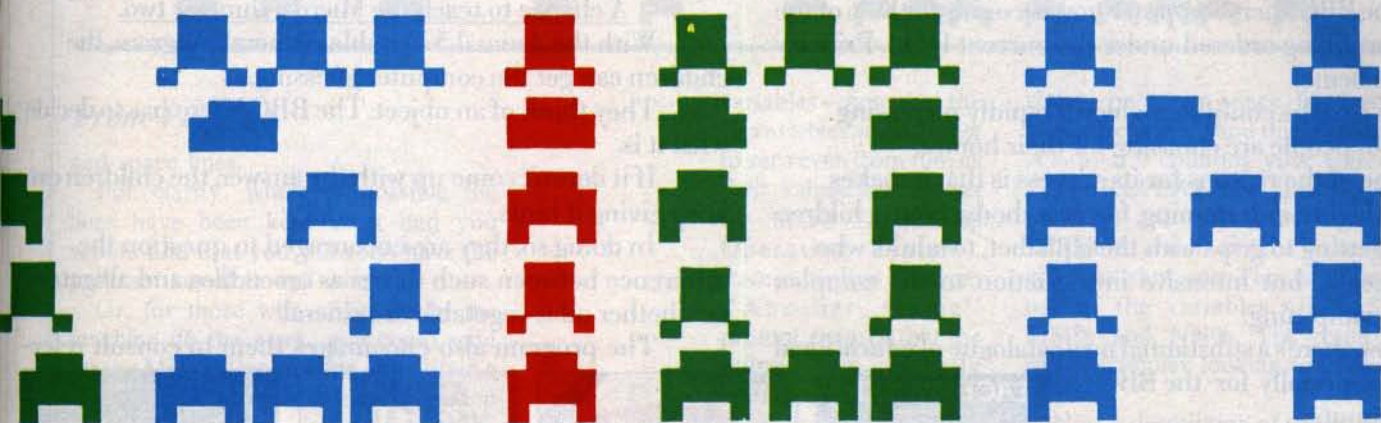
Figure 1



	- !		- a		- P		-
	- "		- &		- '		-
	- \$		- *		- +		-
	- (		- 2		- 3		-
	- 0		- b		- c		-
	- -		- ,		- -		-
	- f		- 4		- 5		-
	- %		- d		- e		-
	-)		- 8		- 9		-
	- 1		- h		- i		-

Table I

program in Mode 7? TOM BLACKBURN has done it!



PRINTCHR\$(91)"x½wt"
is all that is required.

The table is used by printing a graphic control code (&91-&97) followed by the character which represents the required cell, in quotes.

Alternatively, if you have OS 1.2, you can use the CTRL plus FUNCTION keys procedure.

By depressing CTRL+F1, for example, red graphics characters can be entered directly, enabling you to develop your Mode 7 graphics in real time.

Note that all six cells filled requires its

own PRINT or VDU statement – **PRINTCHR\$(255)** or **VDU255** – copied into a function key as defined below.

For fun, set function key F0 as below, and by using the CTRL key to move the cursor position:

CTRL+H = 1 space left

CTRL+I = 1 space right

CTRL+J = 1 line down (40 spaces)

CTRL+K = 1 line up (40 spaces)

and the keyboard with the caps lock off, you can create simple pictures and line drawings.

The F0 setting gives red graphics on all lines except line 0.

Use CTRL+H, CTRL+F1 for line 0. You can change colours by using CTRL plus FUNCTION keys as you wish, but you must not overwrite character 0 of each line, nor any of your colour change characters.

I doubt if Mode 7 will turn you into a computer Picasso, but it's all in the best possible taste!

Function key F0

*KEY0 CLS:F.A=0 TO 23:

VDU145,10,8:N.: F.A=0 TO 23:

VDU11:N.1M

Incidentally, to fill all six cells, you can enter direct VDU 255.

This will simply print a block. You then set the block into a normal function key – *KEY 1 – then copy the block and press Return.

Now function key 1 will display the block whenever pressed.

You must remember that the alphabet is lower case to print graphics. The upper case alphabet is printed as normal in the selected colour.

Finally, in preparation for the real McCoy, try Program II. It is a

demonstration of how to animate your characters. The program displays the mothership, as she quietly drifts to rest at the bottom of your screen.

Her movement is controlled by the FOR-NEXT loop, but is made clear and realistic by printing the space characters before moving the ship and by using the REPEAT-UNTIL, to slow it down.

If you really want to see the BBC Basic moving, delete line 50.

```
10 MODE7:VDU 23;8202;0;0;0;
20 FOR A=2 TO 18
30 B=B+RND(2)
40 PRINT TAB(B,A)CHR$(91)"x½wt"
50 TIME=0:REPEAT UNTIL TIME=100
60 IF A=17 END ELSE PRINT TAB(B,A)" "
70 NEXT
```

Program II

Although it looks lengthy, the Basic is fairly well structured with a few REMs

	- x		- n		- w
	- /		- ll		- v
	- 7		- s		= 8FF or 255 / Set up a function key.
	- g		- y		= space
	- ;		- z		
	- k		- o		
	- =		- ?		
	- m		- ÷		
	- u		- ¾		
	- >		- ¼		



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It has been developed by Acornsoft, the software division of Acorn Computers who manufacture the BBC Micro.

Making faces without getting scolded.

With the new Facemaker program, your children can make over a million faces. It's like an identi-kit, allowing them to depict anyone they want. They start by choosing the eyes. Then they can choose the mouth, the ears, the nose, the facial outline and the hairstyle.

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In Money Match, the challenge is to collect a set of coins, matching them according to shape, size and value.

In Money Box, you can give your child and Mr. T. a helping hand to get all the coins on the screen into the box. (It's always different, because the coins on the screen are based on the small change you have to hand.)

A chance to teach the Micro a thing or two.

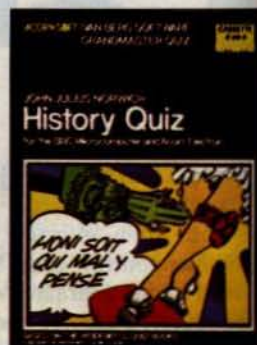
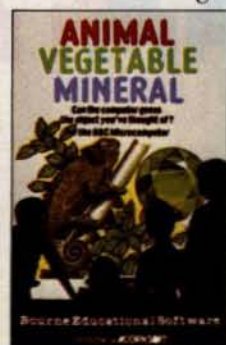
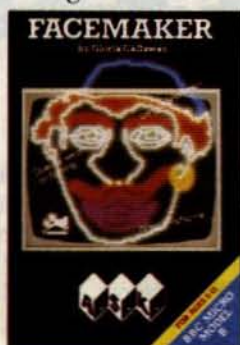
With the Animal, Vegetable, Mineral program, the children can get the computer guessing.

They think of an object. The BBC Micro has to decide what it is.

If it doesn't come up with the answer, the children can keep giving it hints.

In doing so, they are encouraged to question the difference between such things as crocodiles and alligators, or whether oil is vegetable or mineral.

The program also encourages them to consult refer-



ence books so that they can ask the computer increasingly tough questions.

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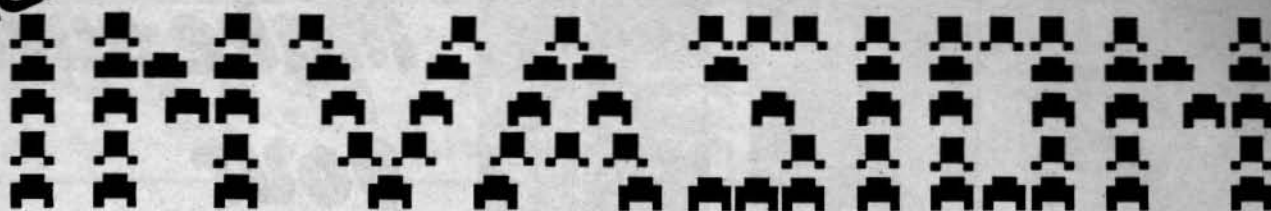
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From Page 65

and space lines.

For clarity, wherever possible the lines have been kept short and you should find that you will soon have the program keyed in and working.

Or, for those who prefer to let the machine do the work, you could send for the Micro User cassette and obtain a completely keyed and debugged version (see Page 137).

For the sake of speed, the program uses the % variables A to Z (yes, all of them), which in some instances saves up to 50 per cent of the time it takes an ordinary variable. A list of their uses is supplied.

The program is entered from RUN, and uses lines 10 to 180 to set up the working environment:

- Lines 10-40** define the ENVELOPES.
- Line 50** uses the ON ERROR routine to return the keyboard to normal and print the error number and line (ERR ERL). refer line.
- Line 60** *TV 255 drops the display 1 line - improves the display on most TVs.
- Line 70** sets mode and switches off the cursor.
- Line 80-90** set up all the arrays and displays the titles.
- Line 100** sets up the "Hall of Fame".
- Lines 110-150** sets the values of the

variables - note that the % variables must be set to zero even from run, as their values are not set by MOS (Machine Operating System). Return to line 80 from "Another Game" prompt ensures that the values are correctly maintained.

Lines 160-170 set the top lines of print (lives left, scores).

Line 180 set time and branch to the main loop.

The Main Loop - line 2000

To be absolutely correct, the main loop does not begin until line 2090, the intermediate lines being used from start and from each cleared screen to set up the battle scenario.

I let the machine do the donkey work in lines 1530 to 1930, using FOR NEXT loops to create the rows of aliens and bases.

As you can see, the string variables AS to ES are preset with the necessary gobbledygook in preparation for the magic control codes.

All processing is by PROCEDURE, apart from the main REPEAT UNTIL loop itself, which performs the routines and marches the invading hordes across your screen.

Before beginning the loop, the invaders are printed by lines 2000 to 2050 which display the aliens without the timing delays within the loop.

Note that for efficiency and thus to increase speed the more aliens you

shoot, only non-space filled rows of aliens are printed and this is achieved by A% to E% counting your kills.

The REPEAT UNTIL variables, T% to W%, are set up during PROC-DIRECT, and must take account of the columns shot out. This is achieved by use of the variables GL%, SGL%, MM% and NN%. The result is the rather complex looking formula at line 2330.

Now a description of the procedures: **PROC-DIRECT**. Sets up the REPEAT UNTIL variables T% to W%. The TT% array helps to ensure that only living aliens are displayed.

The values of T%, V% and W% are modified during the main loop to take account of fully destroyed columns.

Incidentally, the *3 in the formula is the two-character alien plus its space character. Also the values of 20 and 21 are used to restrict space line prints to a minimum.

PROCLINE1 to PROCLINE 5. Actual print of the aliens. They are held in the string arrays AS to ES and are concatenated into APS to EPS by the FOR NEXT loops which use MM% and NN% for the left and right hand columns.

This ensures that the well used technique of shooting out the end columns is catered for.

Note again that for the sake of efficiency the concatenation is only carried out if any aliens in that row have been shot - AA% to EE% are the indicators.

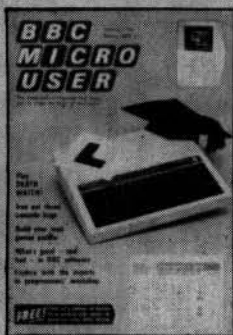
PROC-MOVE. Normal laser movement, achieved by either ADVAL if K% is set from PROCTITLE or the negative INKEY. The negative INKEY is the most efficient and responsive method of key detection and is highly suited to games programming.

Note that F% is checked for bullets in motion (F% > 0) before shoot detection. allowing for the COPY key or shoot button to remain depressed without slowing down the game.

Also the laser has a space character each side, providing smooth movement in one PRINTTAB instruction.

PROCSHOOT. First in a series of nested procedures, PROCSHOOT sets





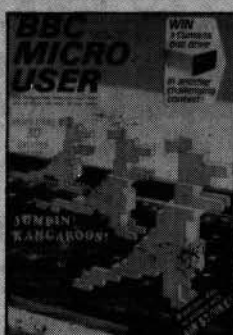
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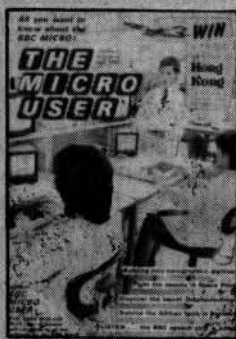
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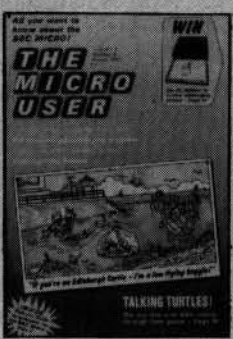
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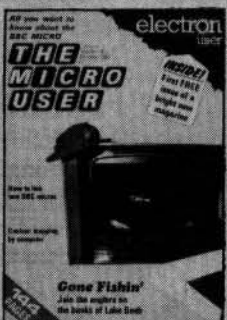
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Tower Bridge - ghostly encounters in the nation's capital. Paged Graphics: 6845 animation techniques. Character Definer an indispensable utility. Smartmouth reviewed. Sound explained, part 2. Body Building, a sound-to-pattern converter. Beginners, working with strings. Slow Down, alters pace of your programs. Graphics: User defined characters. Santa's Saucer and Christmas Card.



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Barrel Battle - an all action arcade game. Graphics, an easy to follow introduction to multiplane images. Noteplay, an entertaining musical utility. Body Building: add a DFS to your micro. Printing. Pixels, a multitone screen dump for Epson printers. Sound advice, flushing sound queues. Beginners, the use of TAB. Adventures, our regular column begins. Bits and Bytes investigates binary operations.



From Page 67

your laser bolt into action. Once fired, the laser is disabled by F% until you hit something or go out of range (line 0 on the screen). F% is the column position of the laser and thus the bullet.

PROCHIT. Moves the bullet up one line. Performs PROCBOMB in fairness to the aliens.

PROCHITA. Checks for a hit. Uses FNHIT to look at the correct screen position – not TUBE compatible. Four checks are involved:

1 – Hit your own base. Screen location value of either 255, 50, 120, 116, or 97.

2 – Hit a bomb. Screen location value 124.

3 – Hit the mothership – line value of 1 and screen location value < 0 or 32 (space). In this case Perform PROCMHIT.

4 – Last < 0 or 32 – hit an alien. Needless to say, perform PROCSCORE.

PROCMHIT. Hit the mothership. Plays a fanfare and gives a random score. Perhaps you might add a delay at this point to show more clearly the score value.

PROCSCORE. No guesses, looks after your score. Actually, it does a fair bit more. Logically, perhaps the most complex routine.

By using DIV and MOD it looks after the rows and columns of aliens – AS to ES, A% to E% for the rows; B4% (1 to 10) for the columns.

It also checks a count of the aliens shot and gives you your "Cleared Screen" award. A little fanfare (perhaps the Close Encounters theme) would go nicely here. I'll leave it to you.

PROCMSHIP. Moves the mothership by time delay. The more purist of you might wish to make her appearance even more random. As it is, she appears sometime after 10 seconds since she last got shot or disappeared – but from which side?

PROCBOMBS. This routine and its subsequent performs will kill you, well it does drop the aliens bombs!

By setting L% to the start position of the highest row of aliens at the beginning ($L\% = HIMEM + (2+Z\%) * 40$) we have the base location for bomb dropping.

HIMEM is the first screen location in this mode.

Z% is the start height depending on screens cleared.

$(2+Z\%) * 40$ gives the address of the first column of the highest line of aliens.

By using this method, we can direct and lower the bombs using the minimum of time-consuming arithmetic:

1. Random choice of one or two bombers.

2. Check AS to ES position to make sure an alien exists.

3. Add the correct screen location values; 80 characters for each line of aliens plus the following line of spaces.

4. Poke – or to be precise $?B2\%(J\%) = 97$ – which means print a bomb below the chosen alien. Note that PROCLOWER uses the formula described in PROCBOMBS to check for a hit and blank out bomb and lower bomb one line.

PROCBOMBED removes a life and, if necessary, ends the game.

PROCTITLE is the first routine performed, prints the introduction and checks for joysticks. Note the interesting use of RIGHTS to display the title.

PROCFAME of course, sets up your rank by FOR NEXT loops.

Overall, the flow of the program is governed by the way the main procedures are performed.

This potentially allows much scope for experiment – changing the frequency of the performs will change the responses and movement of the various characters.

For the adventurous, the laser bullets routines could be changed to use PEEKs and POKEs or even assembler routines – the assembler equivalent of ? is only a STA to a specified address.

I've described the program in detail in a hope that it may be helpful by providing an insight into games programming.

The Mode 7 graphics prove to be more than useful and the techniques used in Invaders could equally well be used in Galaxian, Centipede – even Gorf type games.

In the meantime, I wish you luck. Get keying, and enjoy yourself.

Variables Used

A%	= Count of aliens shot – top line
B%	= Count of aliens shot – second line
C%	= Count of aliens shot – third line
D%	= Count of aliens shot – fourth line
E%	= Count of aliens shot – fifth line
F%	= Position of base for bullets (column)
G%	= Position of bullets (row)
H%	= Height of aliens
I%	= General loop count
J%	= General loop – specifically used in random routines and small loops
K%	= Joysticks
L%	= Screen position in map terms
M%	= General loop
N%	= Position in base – movement routines
O%	= FNHIT calculation – column
P%	= FNHIT calculation – row
Q%	= Mothership movement (direction +1 -1)
R%	= Used to define which alien characters are printed
S%	= Mothership markers
T%	Main loop counts – defines direction of aliens – TT% array helps.
U%	
V%	
W%	
X%	= Result of FNHIT (=FNHIT) – checks for bullet hits
Y%	= High score
Z%	= Lower position of aliens after clearing screen
MM%	= Start of alien string count – increases the prints per line as the columns are cleared (left hand side)
NN%	= End of alien string count – used as MM% from right hand side
LI%	= Used as go to variables in SCORE – defines which alien was hit
AA%	= Indicators for changes to alien lines
AS to ES	= Alien lines
APS to EPS	= Concatenated alien lines
B4%	(1 to 10) = Alien column counts
F3	
GL%	= Additional variables used to continue the leftward movement of the aliens if complete columns have been destroyed.
SGL%	

Listing starts
on Page 127



March Issue

DEATHWATCH, a superb arcade game **BINGO**, clever uses of the randomise function; **BUBBLESORT** routines; **TESTS** function keys in machine code. **0.1 COLOUR** and **GRAPHICS ROUTINES**: create a kaleidoscope of screen designs.



April Issue

KING KONG, rescue girls from the Empire State Building before killing Kong. **NIM**, a structural game of strategy. **TOKENS**, unravel the Basic ROM; **FORMATTER**, an essential disc utility; **DISASSEM**, a full machine code disassembler.



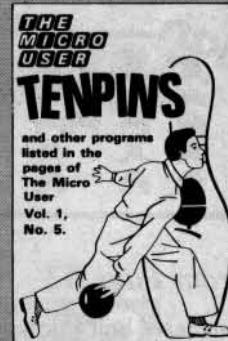
May Issue

AIR STRIKE, a fast and furious arcade game; Test your mental powers with **PELMANISM**; **ANAGRAMS**, the word game. **CHARACTER**, generate vertical and inverted text. **TELETEXT**, animation in Mode 7. **BEEB**, two joystick exercises.



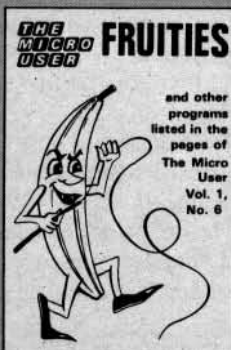
June Issue

SPACE PILOT, lost in space you must fight off repeated attacks from alien life forms. **NOMISM**, you are a nomadic herdsman desperately trying to eke out a living on the plains of Africa. **COLOURFUL CHARACTERS PLUS** other listings from the June issue.



July Issue

TENPIN, a simulation of Tenpin Bowling; **SPACEPODS**, beat the alien hordes; **CUP**, Exciting 3D graphics techniques **TEST** and **STEADY**, programs to accompany the Beeb Body Building Course. **BREAKFIX**, Don't let Break destroy your precious variables!



August Issue

FRUITIES, driven by strange urges you climb the ladders of adventure to risk all in the gardens of unearthly frights. **ANIMATION**, a suite of programs that really bring your screen alive; **CASDISC**, the machine code downloader for your disc system; **MODE 7** colour routines.



September Issue

ROBIN & MARIAN, rescue Maid Marian from the Sheriff of Nottingham. **GALACTIC INVADERS**, an exciting arcade game. **DFS BENCHMARKS**, 14 DFS test programs. **ANIMATION**, new techniques. **TERMINAL**, connect a BBC Micro to a mainframe.

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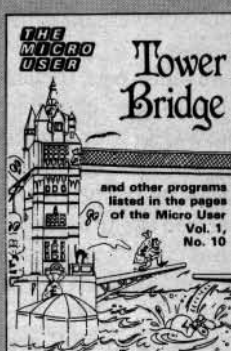
October Issue

FISHING, a compulsive day's angling. **JOYKEY**, convert programs to joystick. **PENTEST** and **BELLRINGER**, for Micro User light pens. **CONTOURS**, an educational program. **LINK BBC Micros** to each other. **PLUS** all the listings from the first Electron User.



November Issue

GOBLINS, an enchanted journey. **BLACKJACK**, the casino favourite. **CHARGE** and **PENDULUM**, Body Building Course part 9. **SIDEWAYS**: programs in ROMs. **PENDRAW**, a light pen sketching program. **PLUS** all the programs from the second Electron User.



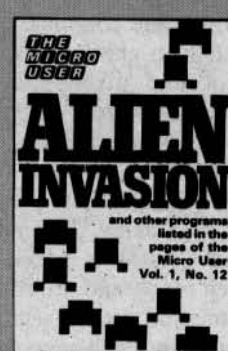
December Issue

TOWER, rescue London's treasure **SANTA**, help Father Christmas deliver his presents. **VDU 23**, an invaluable character defining utility. **PAGED**, the listing from our paged graphics article. **PLUS** all the listings from the third issue of Electron User.



January Issue

BARRELS, an all-action arcade game. **NOTEPLAY**, an entertaining musical utility. **DUMP1** and **DUMP2**, multitone screen dumps. All the programs from our **SOUND, BEGINNERS'** and **GRAPHICS** articles **PLUS** 12 programs from the fourth Electron User.



February Issue

INVASION, the classic arcade game. **FROGS**, fun for all the family. **ENGVGEN**, a logic game. **BALANCE**, a number learning program. **KEY**, single key entry for the BBC Micro **PLUS** nine other programs from The Micro User.

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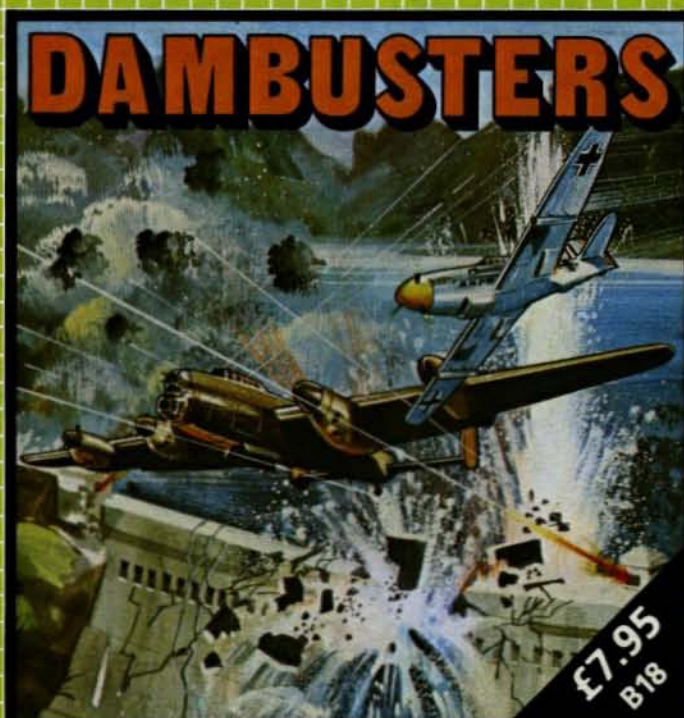
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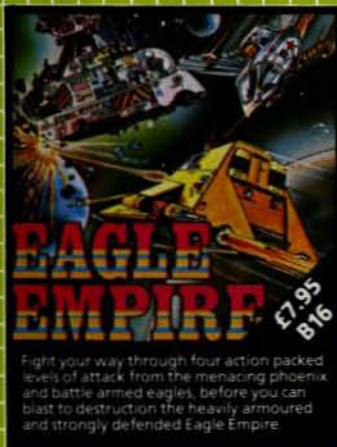
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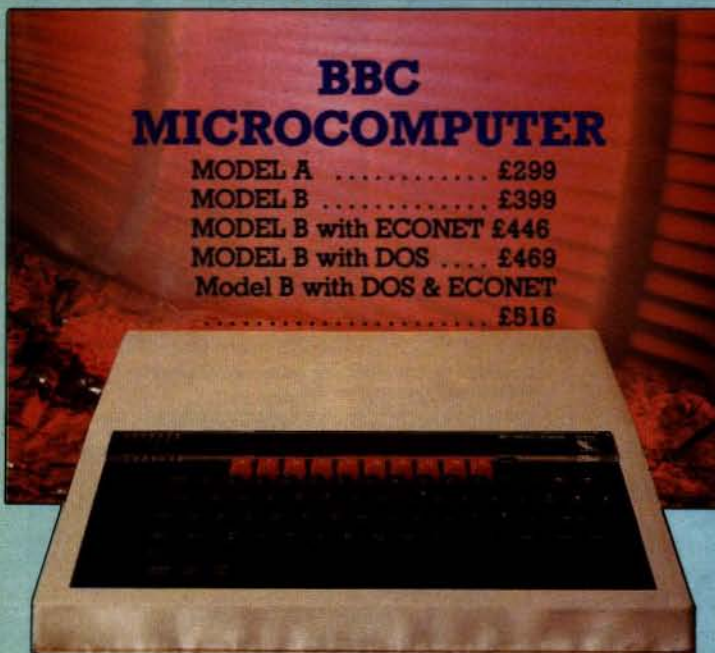
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AN array is a way of storing several connected variables, whether numeric or string. It is much easier to access an array element (that is one variable within the array) than it is to access one variable out of several ordinary variables that have not been connected in the form of an array.

To illustrate this, let us first consider a badly written program (Program I) which is intended to print out a telephone number when a person's name is typed into the computer:-

```
10 INPUT requiredname$
20 IF requiredname$ = "FRED"
   THEN PRINT 545 27364
   :GOTO 10
30 IF requiredname$ = "JANE"
   THEN PRINT 485 4849
   :GOTO 10
40 IF requiredname$ = "JIM"
   THEN PRINT 475 9398
   :GOTO 10
50 IF requiredname$ = "JACK"
   THEN PRINT 455 9989
   :GOTO 10
60 PRINT "NOT THERE"
   :GOTO 10
```

Program I

Although it works, it has several faults which we will now try to improve.

- Line 10 will generate a question mark on the screen, with no explanation as to what it is for.
- Lines 20 to 40 are very similar. It should be possible to find a way to achieve the same result without the repetition (imagine a program written like this containing 1,000 names!).
- Telephone numbers contain spaces. These cause problems in the printout

By PETER DAVIDSON

when they are printed as shown in this program.

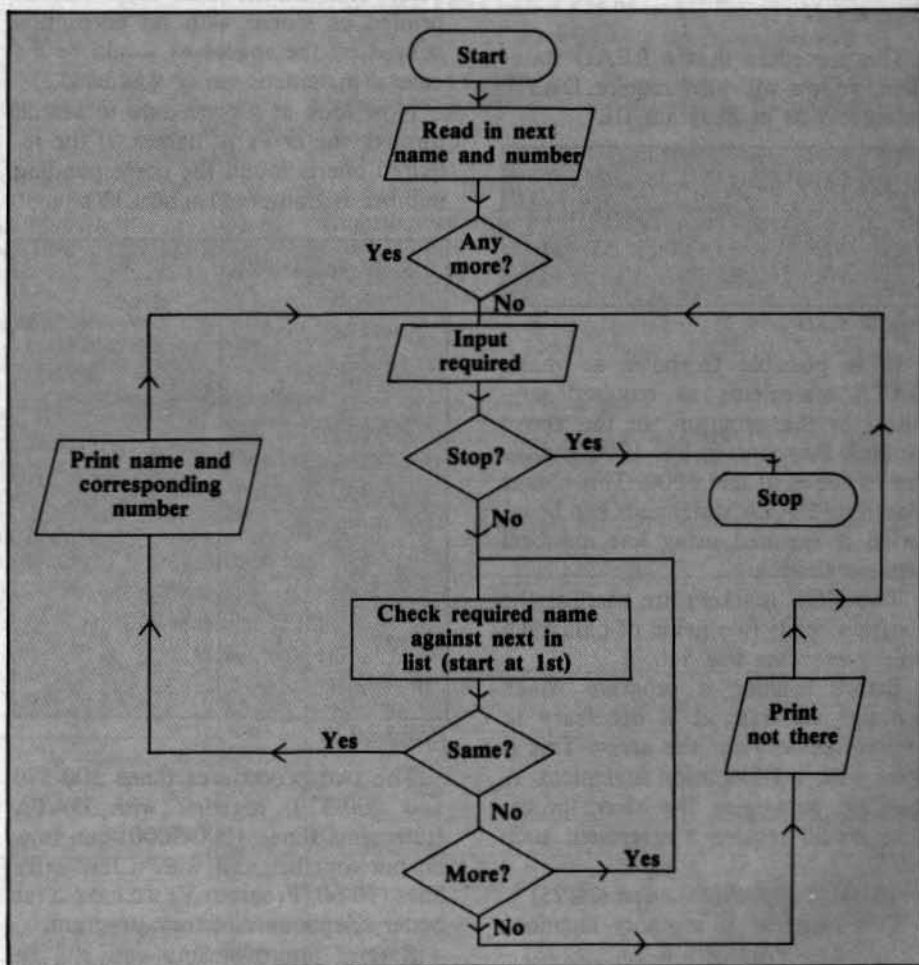
- There is no way to stop the program (except using ESCAPE or BREAK).
- It is very difficult to add new names to the directory.

It must be realised that the use of a computer as a telephone directory is

not of practical use – it is quicker to use the book. But it is an easy application to understand and illustrates the use of arrays quite clearly.

Below is a flowchart showing some of the requirements of a better directory program.

Rather than use several separate variables, this time we shall use a one dimensional array. This means that we



From Page 75

use a single variable name followed by a subscript (which is just a number in brackets).

For example, instead of using first-name\$, secondname\$, and thirdname\$ as variable names we can use name\$(1), name\$(2), and name\$(3). The advantage of this method is that all three can be referred to as name\$(N) and the required one accessed by setting the variable N to the correct value.

Obviously it is much easier to go beyond three variables using this method than by using a completely new name each time.

Let us start by looking at a procedure for setting up two one-dimensional arrays, one of names and one of numbers as in Program II.

```
500 DEF PROCinput
510 count=0
520 REPEAT
530 count=count+1
540 READ name$(count),number$(count)
550 UNTIL name$(count)="EOF"
560 total=count-1
570 ENDPROC
```

Program II

The procedure uses a READ statement, so we will also require DATA statements as in Program III.

```
1000 DATA FRED,545 27364,JANE,485
      4849,JIM,475 9398,JACK,455
      9989
5000 DATA EOF,EOF
```

Program III

It is possible to have as many DATA statements as required anywhere in the program. In the above example they start at line 1000 and the end of file is at line 5000. This means that more DATA statements can be inserted if required using line numbers between these.

Two EOF markers are used as the program reads two items of data each time it executes line 540.

Before running a program which contains an array it is necessary to reserve memory for the array. This is done with a DIMension statement. A program containing the above procedure would require a statement such as:-

```
10 DIM name$(25),number$(25)
```

This reserves 26 memory locations for names - name\$(0) to name\$(25) -

name\$(1) I FRED	number\$(1) I 545 27364
name\$(2) I JANE	number\$(2) I 485 4849
name\$(3) I JIM	number\$(3) I 475 9398
name\$(4) I JACK	number\$(4) I 455 9989
name\$(5) I EOF	number\$(5) I EOF
I	I
I	I

Figure I

and 26 locations for numbers. The procedure shown will not use location 0 but swapping lines 530 and 540 could cure this. The same effect can also be achieved if a variable is used in the DIMension statement, such as:

```
5 N=25
```

```
10 DIM name$(N),number$(N)
```

The above procedure and DATA statements will set up the two required arrays in the memory and also a variable (total) storing how many names and numbers are in the arrays. The arrays can be pictured as in Figure I.

If we search through the array of names and find the required one, the corresponding telephone number will have the same subscript and can be accessed directly.

It should be noticed that a string array has been used to store the numbers. This means that they will be printed as stored with no corruption caused by the spaces as would be the case if a numeric array was used.

Now look at a procedure to search through the array of names. If the required one is found the corresponding number is output (Program IV).

```
700 DEF PROCsearch
710 count=0
720 REPEAT
730 count=count+1
740 IF requiredname$ = name$(count)
   THEN FOUND=TRUE
   ELSE FOUND=FALSE
750 UNTIL FOUND OR count=total
760 IF FOUND
   THEN PRINT requiredname$'s phone
        number is "number$(count)"
   ELSE PRINT requiredname$' is
        not in the list"
770 ENDPROC
```

Program IV

The two procedures (lines 500-570 and 700-770) together with DATA statements (lines 1000-5000) can now be put together and with a few extra lines (10-60, Program V) we have a far better telephone directory program.

Several improvements can still be

made to this program, one simple one being a tidy up of the output. This is left as an exercise for the reader (use CLS and TAB).

```
10 DIM name$(100),number$(100)
20 PROCinput
30 REPEAT
40 INPUT "Whose number is required"
   ,requiredname$
50 PROCsearch
60 UNTIL requiredname$="STOP"
```

Program V

Of the five faults found in the first program, the latter program corrects the first four and improves the last. The names are still contained in the program, but are now in DATA statements and so are quite easy to change. The cure for this is to store the data on tape or disc.

The arrays we have looked at so far are one dimensional, but it is possible to use more than one dimension.

In the above program we could replace the two one dimensional arrays (name\$(X) and number\$(X)) by one two dimensional array, which we could call info\$(X,Y) where X will be the number of names and phone numbers and Y will be a 1 or 2 (1 corresponding to a name and 2 corresponding to a number).

The "picture" that you can use of a two-dimensional array is shown in Figure II.

info\$(1,1)	info\$(1,2)
FRED	545 27364
info\$(2,1)	info\$(2,2)
JANE	485 4849
info\$(3,1)	info\$(3,2)
JIM	475 9398
info\$(4,1)	info\$(4,2)
JACK	455 9989
info\$(5,1)	info\$(5,2)
EOF	EOF

Figure II

To use a two dimensional array in

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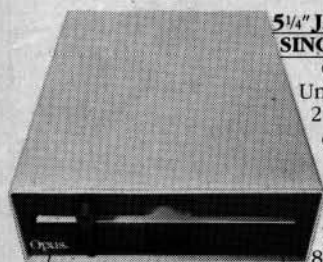
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From Page 75

your program the following changes are required (Program VI).

```

10 DIM info$(100,2)
540 FOR N=1 TO 2
:READ info$(count,N)
:NEXT
550 UNTIL info$(count,1)="EOF"
740 IF requiredname$ = info$(count,1)
THEN FOUND=TRUE
ELSE FOUND=FALSE
760 IF FOUND
THEN PRINT requiredname$ "s phone
number is "info$(count,2)
ELSE PRINT requiredname$ " is
not in the list"

```

Program VI

There are advantages to both methods. The two one dimensional array method has the advantage that name\$(20) obviously refers to the twentieth name and number\$(20) to the twentieth number. This is much clearer than info\$(20,1) and info\$(20,2).

On the other hand a two dimensional array uses less memory, and if more items are stored – for example, address, date of birth, occupation – all that is required is to change the limits of the FOR . . . NEXT loop in line 540 and use a loop in line 760.

All the relevant information about a person whose name is typed in would then be printed out. But note that the DATA will also need corresponding changes.

Finally we present a program which prints out sentences, missing out a word (or group of words). Although the present data is nursery rhymes, other data can easily be substituted. The program uses three one dimensional arrays:

START\$(NUMBER)
MISS\$(NUMBER)
FIN\$(NUMBER)

A random number is chosen and the corresponding elements of the first and last array are printed out, together with stars corresponding to each letter of the middle one.

If a word is typed in correctly, a congratulation message is chosen at random from the three messages in the one dimensional array CONGRATS\$(NUMBER).

If an error is made the message is

taken from the two dimensional array ERRMSG\$(NUMBER1,NUMBER2), where NUMBER1 corresponds to the number of attempts at the question and NUMBER2 is chosen at random so that one of three different messages is printed out at random, making nine different messages possible.

To modify this program the following line numbers are easily changed:

780 . . . the number of sentences in the data.

800 . . . the title.

1000 onwards . . . the sentences. These are entered in three parts with commas around the word(s) that you want missing out.

Note that if your sentence contains commas, quotes must be put around that part of the sentence.

820 to 960 . . . the messages. REM statements show which are error and which are congratulations.

```

1 REM ***MISSING WORDS***
2 REM ***PETER DAVIDSON 2/84***
10 MODE 7
20 *FX11,0
30 VDU 23:8202;0;0;0;
40 PROCINITIALISE
50 PROCINSTRUCTIONS
60 RIGHT=0
:PROCHEADING
:PROCTITLE
70 PRINT TAB(0,14)CHR$(RND(7)+128)
"HOW MANY QUESTIONS DO YOU REQUIRE"
80 PRINT CHR$(RND(7)+128)"(TYPE
A NUMBER AND PRESS RETURN)";
:INPUT MAX
:IF MAX=0
THEN 70
90 QUESNO=0
100 REPEAT
110 QUESNO=QUESNO+1
120 PROCSELECTSENTENCE
130 PROCINPUTCHECK
140 UNTIL QUESNO=MAX
150 PROCHEADING
:PROCTITLE
:PRINT TAB(0,15)CHR$(RND(7)+128)
"YOU GOT "STR$(RIGHT)" RIGHT
(FIRST TIME) OUT OF "STR$(MAX)
160 PRINT TAB(0,20)CHR$(RND(7)+128)
"DO YOU WANT ANOTHER GO? (Y OR
N)"
170 IF GET$="Y"
THEN 50
ELSE END
180 DEF PROCINITIALISE
190 READ POSSIBLE
200 READ TITLE$
210 DIM START$(POSSIBLE),MIS$(POSSIBLE),FIN$(POSSIBLE),ERRMSG$(3,3),CONGRATS$(3)
:X=RND(-TIME)
220 FOR I%=1 TO 3
:FOR J%=1 TO 3
:READ ERRMSG$(I%,J%)
:NEXT J%,I%
230 FOR I%=1 TO 3
:READ CONGRATS$(I%)
:NEXT
240 FOR I%=1 TO POSSIBLE
:READ START$(I%),MIS$(I%),FIN$(I%)
:NEXT
250 ENDPROC
260 DEF PROCINSTRUCTIONS
270 PROCHEADING
280 PROCTITLE
290 PRINT TAB(0,9);CHR$(130)"THE
COMPUTER WILL PRINT A SENTENCE"
300 PRINT CHR$(130)"WITH A WORD
MISSING. YOU MUST TYPE IN"
310 PRINT CHR$(130)"THE MISSING
WORD"
320 PRINT
:PRINT CHR$(134)"THE MISSING
WORD WILL BE SHOWN BY THE"
330 PRINT CHR$(134)"CORRECT NUMBER
OF STARS AND YOUR"
340 PRINT CHR$(134)"ANSWER WILL
APPEAR AS YOU TYPE IT"
350 PRINT
:PRINT CHR$(129)"YOUR SCORE
WILL BE GIVEN AT THE END"
360 PRINT
:PRINT CHR$(131)"PRESS A KEY
WHEN YOU ARE READY TO START"
370 A=GET
380 ENDPROC
390 DEF PROCSELECTSENTENCE
400 NUMBER=RND(POSSIBLE)

```




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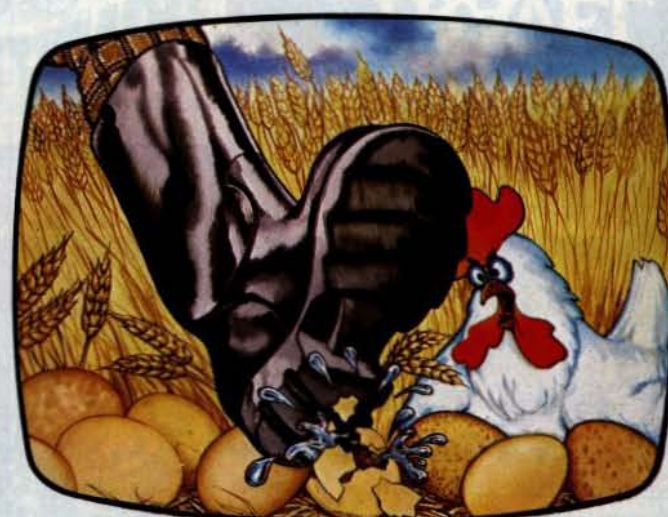
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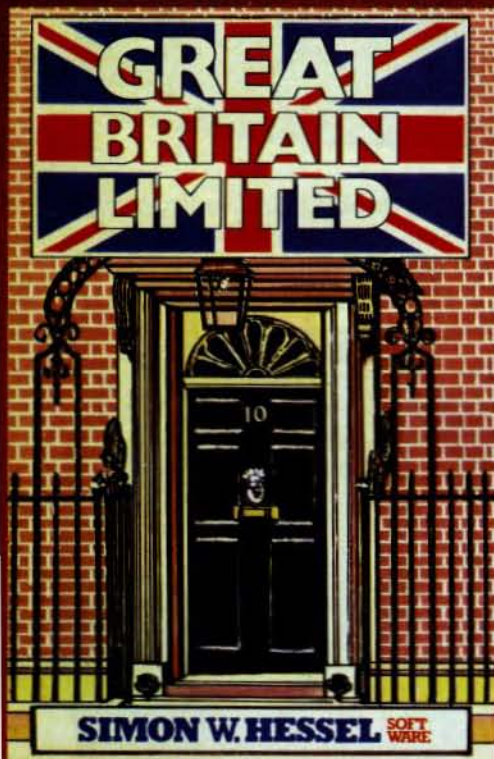
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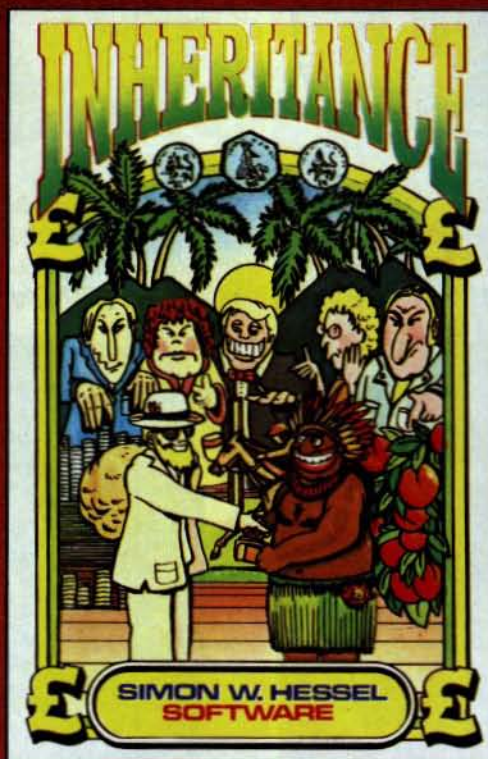


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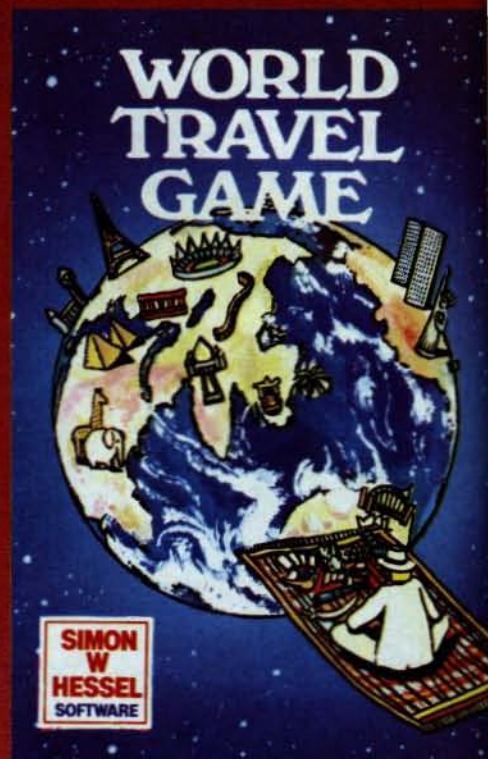
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The RAM board may be combined with the ROM extender board, or used as a stand-alone unit.

Note that when the ROM extender board has been connected all paged ROMs must be moved from the BBC board onto the ROM board. The operating system ROM should, of course, be left where it is.

In the BBC Micro the number of the ROM currently selected is held in a four bit latch (IC 76), bits 0 and 1 being decoded by IC 20 to provide the four "select" signals for the onboard ROMs.

This extender board uses a 74LS154 to decode all four latch outputs into the 16 ROM select lines.

All the address and data lines are buffered to reduce the loading on the computer's address and data buses.

The RAM board is very straightforward, consisting of eight 6116 2k RAM chips, with a 74LS138 being used

By MIKE HARRISON

for address decoding.

Most of the signals to drive the extender board are taken from one of the now vacant ROM sockets on the BBC board via a 28-way DIL header plug, the few remaining signals being taken from the pins of IC 76, IC 77 and S21.

These connections may be made by soldering wires to the appropriate IC pins, or alternatively the connections may be made to the pins of wire-wrap type IC sockets, which can then be plugged into the sockets for ICs 76 and 77, and the ICs replaced in the wire-wrap sockets.

A connection is required to S21 (south), and this can be made by soldering a wire to the small exposed metal part of the jumper joining the south-east and south-west pins of S21.

The circuit diagrams of the ROM and RAM boards are shown in Figures I and II on Page 84 and 85

Several methods may be used to construct this unit.

The masochistic reader may like to design a printed circuit board for it or, alternatively, Veroboard or one of the various Eurocard type boards may be used, but this would require an enormous amount of interwiring.

The Road-Runner wiring pen system was used for the prototype, as this is a very easy and quick way of making a large number of connections between IC sockets.

Unfortunately it is also quite easy to

make mistakes, especially if you forget that the IC pin numbers are reversed left to right when looking at the underside of the board.

A few minutes spent drawing the pinouts of all the ICs with the pins reversed – that is, pin 1 becomes pin 28 etc. – can save a lot of time and avoid mistakes messy to correct.

The prototype ROM extender and RAM was built on two boards – a square-pad type Eurocard for the 15 ROM sockets and the 74LS154, and a Vero Microboard for the bus buffers and RAM chips. (The ROM card was a very tight squeeze.)

Whichever method of construction is used, it should be remembered that the power supplies to all the chips should be well decoupled, and this may be achieved by connecting a 0.05 or 0.1 micro farad capacitor between the +5v and 0v pins of each chip.

If a wiring pen is used to build the ROM or RAM boards, the wiring to the +5v and 0v pins of all the chips should be done with thicker wire than that used in the wiring pen, or several strands of wiring pen-type wire.

It is strongly recommended that turned-pin type IC sockets are used for the ROMs because normal sockets tend to become unreliable or intermittent after several insertions of the ICs and, when they are soldered in, solder can sometimes "wick up" into the contacts, making them less reliable.

Although turned-pin sockets are considerably more expensive than ordinary ones, they will make the unit a lot more reliable.

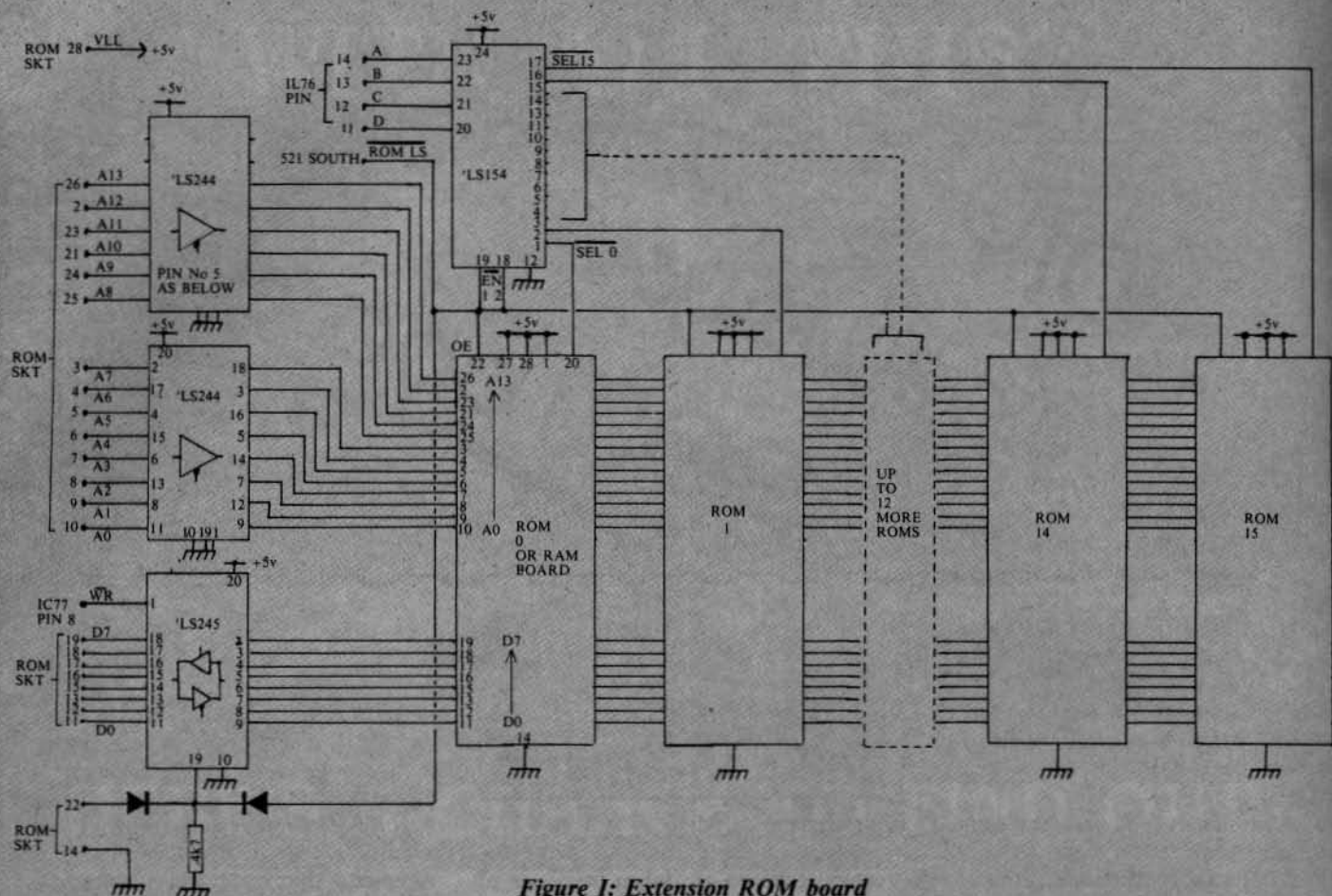


Figure 1: Extension ROM board

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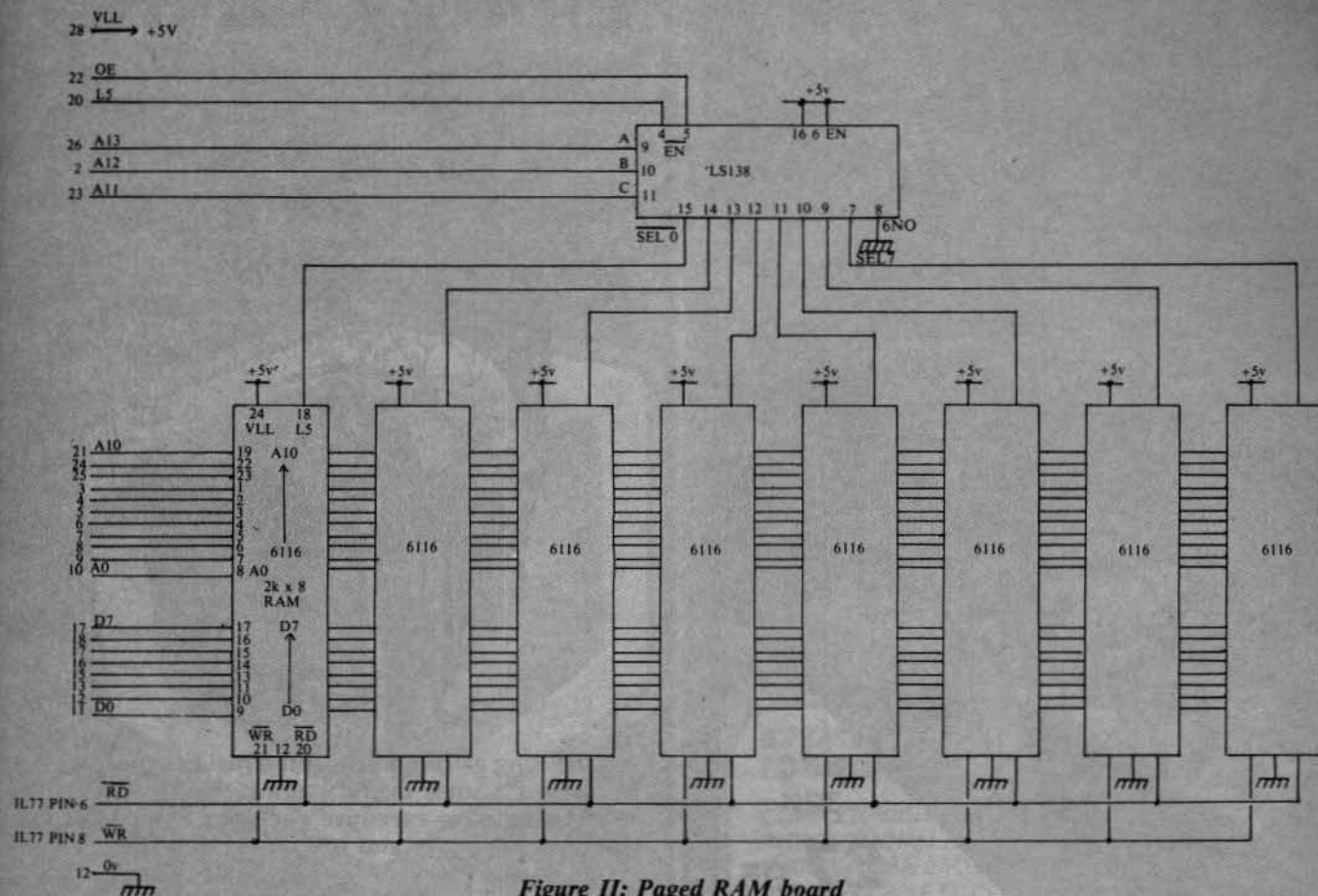


Figure II: Paged RAM board

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Before release, all the programs are thoroughly tested both in the home and school environment. They are available both on 5¼" disc and cassette. All programs are available for both the BBC Model B Computer and the Acorn Electron.

TEACHER IN THE CUSTARD

Teacher in the Custard is an innovative game which helps children to learn basic arithmetic. It is subtle and offers a great deal of control for the parent/teacher. The objective is simple. It is for the pupil to lower their teacher into a bowl of custard! This is achieved by giving the correct answers to questions. The program keeps a score table of the number of wrong answers against the pupils name, and various parameters can be changed by the parent/teacher to set targets appropriate to the ability of the pupil. If the pupil is successful in ducking the teacher in the bowl of custard the teacher climbs out of the custard and runs off the screen. Children love the program and its ability to test anything from simple addition to any times table makes it a very versatile program for teaching basic mathematics. It is suitable for an age range from about 5 to 12 years.

CASSETTE £8.50 DISC £11.00

CARAVAN TREK

This is a game that involves the pupil moving a caravan train through the desert and mountains in order to reach a boat moored at the coast. The pupils have to plan the route and pick up supplies of fuel and food, together with maps on the way. Upon reaching a supply dump the pupil is asked a question which is preset by the parent or teacher before they are allowed to obtain the supplies. The program is graphical and a totally different landscape is produced each time it is played. Before the game begins the parent sets a number of questions on any subject and gives the computer the correct answers. A great deal of flexibility is allowed so that questions may be set on any subject at all and the game made into a family game with some of the questions being quite specific to the child. The game effectively teaches the use of simple co-ordinates and requires a simple planning strategy. The educational value of the game is very high and is one of a continuing package of similar games that is intended to link up with one another. In all, an exciting game for the seven to twelve year old.

CASSETTE £8.85 DISC £11.35

PLAY WITH WORDS

Play with words is a very adaptable game suitable for all age ranges from the youngest infant to the adult. Exercises are created by the parent/teacher beforehand and the game consists of placing a set of up to eight items in the correct order. Exercises may be set on any subject, ranging from the nutritional value of food to simple mathematics and the ordering of sentences into paragraphs etc. The program allows for the creation of files so that once exercises are created they may be stored on tape or disc and automatically read in when the pupil is using the program. This is a program which you really have to see working to appreciate its versatility.

CASSETTE £8.50 DISC £11.00

ANGLE TUTOR

This program is designed for the 8 to 12 year age range. Angle Tutor is an extremely well planned,

thoroughly tested program designed to allow children to discover and learn the concept of an angle. It is suitable for a wide ability range and the brighter six year old would probably form the lower end of the age range. The pupil progresses at his own pace and as the program is interactive, his progress is automatically channelled by his performance. Achievement can be rewarded by the Angle Grade Awards provided with the cassette or disc. The program is based on the circle and teaches the concept of the angle as segments of that circle.

CASSETTE £9.95 DISC £12.45

POLYGON TUTOR

This program carries on where Angle Tutor finishes to extend understanding into the basic properties of polygons. It is suitable for the 7-13 year old.

CASSETTE £7.50 DISC £10.00

TRIANGLE TUTOR

This is a simple program that tests the understanding of the basic internal properties of triangles.

CASSETTE £6.50 DISC £9.00

ANGLE PACK 2

Angle pack 2 consists of Angle Tutor, Polygon Tutor and Triangle Tutor all in one integrated system. This is an excellent value for money package which starts with the basic understanding of what an angle is, leading onto the properties of polygons and triangles. Presentation is excellent and children using the package will be able to progress from one stage to the next depending upon their performance. The parent/teacher may over-ride and choose any particular part of the package for immediate use. The pack comes complete with small certificates which can be used to prove that the pupil has attained certain grades in the exercise. These range from Angle Grade 1 to Angle Grade 4 Awards.

CASSETTE £11.50 DISC £19.95

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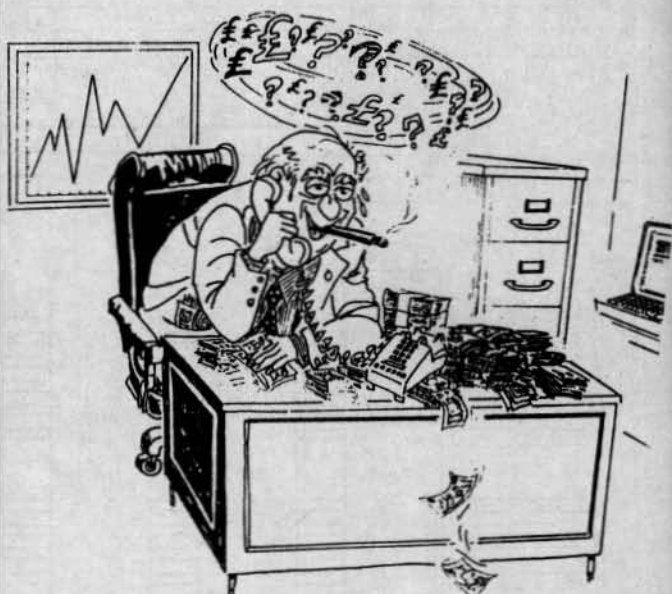
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WELL, the commissioners of the European Economic Community have done it again! With a stroke of genius that makes us gasp with astonishment they have decided that they can take the cost of running the community's art galleries, currently 3 million Euro-daubs, and reduce it to a mere 2.9 million Euro-daubs.

The Euro-daub, by the way, is the community's international currency of arts subsidy and is approximately equivalent to seven French francs or three German alberts.

The only snag is that to instal the proposed automatic system will cost the equivalent of six million Euro-daubs, and thus it will take until AD 2043 to repay the investment.

That is not, of course, counting the cost of retraining the staff and paying a high technology bonus to the members of the Allied Union of Boilermakers and Curators.

To make matters even worse, they have decided to implement the Dive Eclair Automatic Picture System. This is well known to be the cheapest — but will it do the job?

For those of you who do not know the history of that master entrepreneur, Dive Eclair, I will relate a little about him.

Dive started out making low-fi units for the home enthusiast. He did this by advertising them as fi units of greater altitude and when the money had rolled in he then sat down and actually designed them.

One of the main selling points was their extraordinarily small size, and not many people know that Dive used to scour the Belgian Congo (as it then was) for tribes of very small pigmies to do his design and manufacture.

Like all successful businessmen Dive

began to diversify his product range. It was here that he scored his biggest success which brought him into the public eye. You see he managed to find some Eskimos stupid enough to buy snowballs from him.

The idea of prefabricated snowballs caught the public's imagination, and the major broadcasting corporations collaborated to make a series of programs, "Making the Most of Your Snowballs".

They also decided that there should be a standard snowball to go with the programs and asked for tenders.

Unfortunately for Dive Eclair he did not get the contract, although he

By MIKE COOK

maintains, and quite rightly, that a lot of people would have liked to throw his balls.

Instead the contract went to a rival company, Oaktree Snowballs Ltd. They are perhaps best remembered for their excuse for late delivery, which has become a bureaucratic standard in a remarkably short time.

For those of you unfamiliar with it, it is: "Our subcontractors, Ferruncle, are having trouble with the ULA".

The genius of this line was later uncovered when ULA was found to stand for Unexpected Late Arrival.

This gave Dive little pleasure however as he reckoned he could have come up with something even better on the grounds that he has had more practice.

Undaunted by this setback, Dive's talent for homing in on the more gullible and weakminded section of the

population led him inevitably to receive a huge contract from the EEC. This was to develop the Automatic Picture Gallery.

The idea was that a lot of time spent putting pictures into frames and then taking them out could be saved if the whole process was automated.

All you would need to do was to press a frame's number on a keyboard and the picture in it would automatically be removed.

Dive took this simple idea and adapted it so that you could not only clear an exhibition but also set one up with no extra controls. This, like most of his ideas, was very clever.

Unfortunately, like all of his ideas, it was not quite clever enough. What he did was to incorporate the idea of interdependent controls.

He first developed these on his low-fi units where altering the bass control would also effect the treble. Likewise altering the treble control would also effect the volume and so on.

In his new venture the idea was taken one step further. Pressing any of the picture frame numbers would remove the picture from the frame, but would also reverse the state of nearby frames, thus eliminating the need for a remove/place switch on the console.

This saving, however, made the unit very difficult to operate.

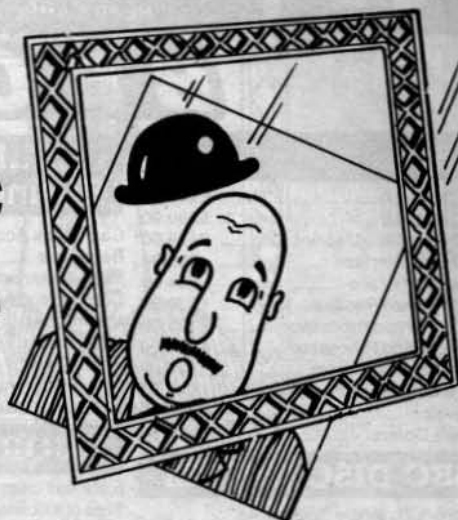
The commissioners do not want people to know how difficult this is to use, but at the same time must be seen to be doing something about training.

So they have come up with a computer simulation of the gallery that they hope will never be run by anybody. In order to achieve this they have decided to publish the program as an error-free listing.

It has long been known that an error



The EEC Automatic Picture Gallery



free listing is one of the safest ways of protecting a program from being run.

You see, if you add errors people can negate their effect by the errors they introduce themselves. Only with an error-free listing will the newly introduced errors be able to flourish.

The lines that the commissioners are hoping nobody will be able to type in are lines 150 and 410. These contain strings of blank spaces and you must type in exactly the right number for the program to run – they need nine spaces in each line.

Don't worry, just because I have told you about this doesn't mean that nobody will get it wrong. After all, who reads the *words* in a computer magazine anyway?

There are two exercises for which the simulator can be used. One is clearing all the frames, and the other is filling the frames.

Of the two, the first is the easier but the controls operate the same way whichever exercise you are doing. The pictures in the corners, the centre and the middle of each row affect the surrounding pictures in various ways.

To help you in this simulator the red-faced bureaucrats in the portraits wear different coloured bowler hats to give you an indication of how they will affect the adjacent pictures.

Also, if a bureaucrat is out of a frame he gets quite flushed. Those of you without a colour monitor can best operate this simulator by going out and buying one. Second best is to note the shades of grey.

In any event the position of the pictures determine how they will behave, so not to worry.

Watch for a subtle effect in the exercise where you have to fill up all the frames. If all the frames surround-

ing the centre are included then the centre frame will look like it is also included.

The way to tell if it is not included is to see if the bureaucrat is ashen faced. If so there is no frame in that position.

When an exercise is set up you will be told the least number of key strokes (turns) that can be used. It takes a real expert to do it in this few, so do not get discouraged.

Remember that only if a picture is present can you press the key to remove it. If you press a key and there is no picture the only effect will be to add one to the number of turns you have had.

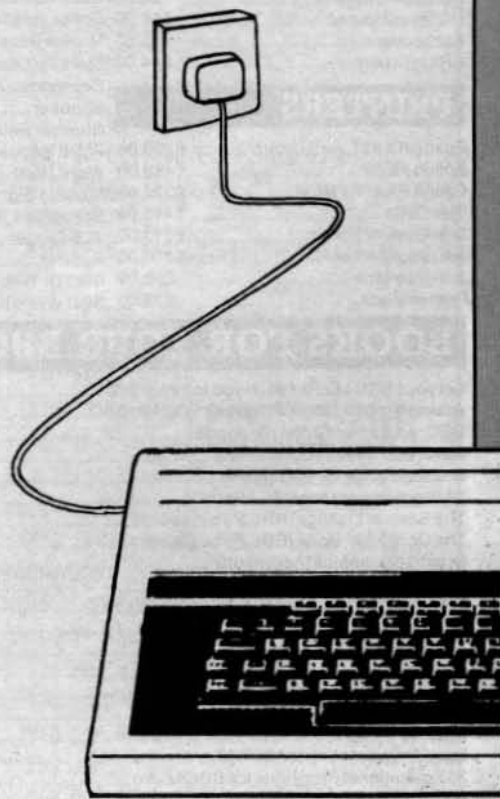
Also, just to catch you out, if you leave your finger on the key too long the auto repeat facility will make your score mount even faster.

When one of the technocrats was asked how the program worked I was told it was all held together by string, but I think that should have been strings!

In any event, it is far too tedious to explain, even assuming anyone would bother to read it. However if you do not want to see a red-faced bureaucrat, and think that green is a colour more likely to reflect their experience, then replace the number 145 in line 140 with 146. There, that should ensure even more errors!

Those of you with sharp eyes will have noticed that line 30 in the program is not needed at all. It has to be included, however, to help reduce the Common Market's envelope mountain.

Finally, be forewarned. This is a very difficult gallery to operate and should ensure that Dive Eclair receives another Beans Award for Industry. At least that's what beans do for me!



**Listing starts
on Page 93**



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B2



EEC Automatic Picture Gallery listing



From Page 91

```

10 REM EEC AUTOMATIC GALLERY M.K.Co
ok
20 ENVELOPE 1,25,16,12,8,1,1,1,10,-
10,0,-10,126,50
30 ENVELOPE 2,2,2,-2,2,10,20,10,1,0
,0,-1,126,100
40 DIM TX(9),TY(9),F$(9),P$(9)
50 DIM G0$(9),CS$(9),TRY(9),FS$(9)
60 REM SET UP FRAMES
70 R$=CHR$(10)+STRING$(13,CHR$(8))
80 T$=STRING$(11,CHR$(255))
90 FOR N=1 TO 9
100 READ TX(N),TY(N),C
110 F$(N)=CHR$(31)+CHR$(TX(N))+CHR$(
TY(N))
120 F$(N)=F$(N)+CHR$(255)+T$+CHR$(25
5)+R$
130 FOR K=1 TO 5
140 IF K=3 THEN C=145
150 F$(N)=F$(N)+CHR$(255)+CHR$(C)+
" +CHR$(151)+CHR$(255)+R$
160 NEXT
170 F$(N)=F$(N)+CHR$(255)+T$+CHR$(25
5)
180 NEXT
190 MODE 7
200 PRINT
210 PRINT TAB(13,2),CHR$(141);"THE E
EC"
220 PRINT TAB(13,3),CHR$(141);"THE E
EC"
230 PRINT" AUTOMATIC ART GALLERY SI
MULATOR"
240 REM SET UP THE PORTRAITS
250 R$=LEFT$(R$,10)
260 P$=""
270 FOR N=1 TO 9
280 TX(N)=TX(N)+2
290 TY(N)=TY(N)+1
300 NEXT

```

```

310 FOR N=1 TO 5
320 FOR K=1 TO 9
330 READ T
340 P$=P$+CHR$(T)
350 NEXT
360 P$=P$+R$
370 NEXT
380 REM SET UP BLANK PORTRAITS
390 PB$=""
400 FOR K=1 TO 5
410 PB$=PB$+" "+R$
420 NEXT
430 FOR N=1 TO 9
440 READ G0$(N)
450 NEXT
460 PRINT:PRINT
470 PRINT"Remove portraits by typing
their number"
480 PRINT"Regretably adjacent frames
are changed"
490 PRINT
500 PRINT"Type Q to QUIT an exercise
"
510 PRINT:PRINT
520 PRINT"EXERCISE 1 YOU CLEAR THE F
RAMES (EASY)"
530 PRINT" LEAVING THEM AL
L EMPTY"
540 PRINT
550 PRINT"EXERCISE 2 YOU FILL ALL FR
AMES (HARD)"
560 PRINT" AND LEAVE NOTHI
NG OUTSIDE"
570 PRINT" THE BUREAUCRAT
IS WHITE"
580 PRINT" WHEN OUT OF HIS
FRAME"
590 PRINT
600 PRINT "WHICH EXERCISE ";
610 GAME=GET AND 15
620 PRINT GAME
630 GAME=(GAME-1) EOR 1

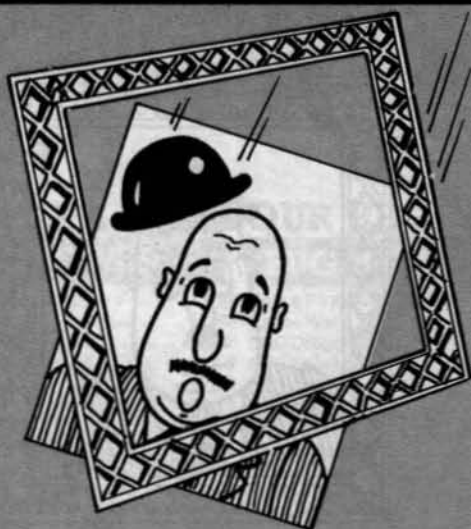
```

```

640 IF GAME=0 OR GAME=1 THEN 680
650 PRINT"I CAN SIT IN THIS LOOP ALL
DAY"
660 GAME=0
670 GOTO 600
680 PRINT"DO YOU WANT SOUND ";
690 A=GET
700 S=TRUE
710 IF A=78 THEN S=FALSE
720 PRINT CHR$(A)
730 IF A=78 THEN SD=1 ELSE SD=0
740 REM START OF GAME
750 PROCPOSE
760 PROCSETUP
770 G% = GET
780 IF G%=81 THEN 750
790 G%=G% AND 15
800 IF G%<1 OR G%>9 THEN 770
810 PRINT TAB(0,22)," "
820 TN=TN+1
830 PRINT TAB(10,21),TN,TAB(23,21),G
%
840 IF CS$(G%)=0 THEN 770
850 PROCDIS(G%)
860 PROCTESTEND
870 IF JM=0 AND GAME=1 THEN 770
880 IF JM=1 AND GAME=0 THEN PRINT TA
B(0,23),"***** YOU BLEW IT *****
*****":GOTO 770
890 IF JM=1 AND GAME=1 THEN PROCWIN
:GOTO 750
900 PROCCMXEND
910 IF JM=0 THEN 770
920 PROCWIN
930 GOTO 750
940 DEF PROCTESTEND
950 JM=1
960 FOR AX=1 TO 9
970 IF CS$(AX)=1 THEN JM=0
980 NEXT
990 ENDPROC

```


EEC Automatic Picture Gallery listing



From Page 93

```

1000 DEF PROCDIS(NX)
1010 LOCAL AX,TX
1020 FOR AX=1 TO LEN(GO$(NX))
1030 TX=VAL(MID$(GO$(NX),AX,1))
1040 IF CS$(TX)=0 THEN PROCON ELSE PR
OCOFF
1050 CS$(TX)=CS$(TX) EOR 1
1060 NEXT
1070 ENDPROC
1080 DEF PROCOFF
1090 IF S THEN PROCSOFF
1100 PRINT TAB(TX(TX),TY(TX)),PB$
1110 ENDPROC
1120 DEF PROCON
1130 IF S THEN PROCSON
1140 PRINT TAB(TX(TX),TY(TX)),P$
1150 ENDPROC
1160 DEF PROCSON
1170 SOUND 1,0,49,8
1180 SOUND 1,1,149,20
1190 SOUND 1,-15,245,1
1200 SOUND 1,0,49,1
1210 REPEAT
1220 UNTIL ADVAL(-6)=15
1230 ENDPROC
1240 DEF PROCSOFF
1250 SOUND 1,0,49,8
1260 SOUND 1,-15,49,1
1270 SOUND 1,0,49,1
1280 REPEAT
1290 UNTIL ADVAL(-6)=15
1300 ENDPROC
1310 DEFPROCPOSE
1320 FOR K=1 TO 9
1330 TRY(K)=0
1340 FS$(K)=GAME
1350 CS$(K)=0
1360 NEXT
1370 IF GAME=1 THEN 1470
1380 FT=RND(8)
1390 REPEAT

```

```

1400 REPEAT
1410 K=RND(8)
1420 UNTIL FS$(K)=0
1430 FS$(K)=1
1440 CS$(K)=1
1450 FT=FT-1
1460 UNTIL FT=0
1470 TRYT=RND(8)+1
1480 MINT=TRYT
1490 REPEAT
1500 REPEAT
1510 N=RND(9)
1520 UNTIL TRY(N)=0 AND CS$(N)=0
1530 TRYT=TRYT-1
1540 TRY(N)=1
1550 PROCTURN(N)
1560 PROCJAM
1570 UNTIL TRYT=0 OR JM=1
1580 MINT=MINT-TRYT
1590 ENDPROC
1600 DEFPROCJAM
1610 JM=1
1620 FOR AX=1 TO 9
1630 IF TRY(AX)=0 AND CS$(AX)=0 THEN
JM=0
1640 NEXT
1650 ENDPROC
1660 DEF PROCJXEND
1670 JM=1
1680 FOR K=1 TO 9
1690 IF FS$(K)=1 AND CS$(K)=0 THEN JM
=0
1700 IF FS$(K)=0 AND CS$(K)=1 THEN JM
=0
1710 NEXT
1720 ENDPROC
1730 DEF PROCTURN(NX)
1740 LOCAL AX,TX
1750 FOR AX=1 TO LEN(GO$(NX))
1760 TX=VAL(MID$(GO$(NX),AX,1))
1770 CS$(TX)=CS$(TX) EOR 1
1780 NEXT
1790 ENDPROC

```

```

1800 DEF PROCSETUP
1810 TN=0
1820 CLS
1830 FOR K=1 TO 19
1840 VDU 151,10,8
1850 NEXT
1860 FOR K=1 TO 9
1870 IF FS$(K)=1 THEN PRINT F$(K)
1880 IF CS$(K)=1 THEN PRINT TAB(TX(K)
,TY(K)),P$
1890 NEXT
1900 IF GAME=1 THEN PRINT TAB(11,19)
,"CLEAR THE GALLERY" ELSE PRINT TAB(10
,19),"SET UP THE GALLERY"
1910 PRINT "1 2 3          TURN
FRAME"
1920 PRINT "4 5 6"
1930 PRINT "7 8 9"
1940 PRINT "          CAN BE DONE IN
";MINT;" TURNS"
1950 ENDPROC
1960 DEF PROCHIN
1970 PRINT TAB(0,23),"CONGRATULATIONS
PLEASE HIT ANY KEY";
1980 A=GET
1990 ENDPROC
2000 DATA 1,0,147,13,0,149,25,0,147
2010 DATA 1,6,149,13,6,150,25,6,149
2020 DATA 1,12,147,13,12,149,25,12,14
7
2030 DATA 160,160,248,252,252,252,244
,160,160
2040 DATA 240,255,255,255,255,255,255
,255,240
2050 DATA 160,160,247,255,175,255,251
,160,160
2060 DATA 160,160,183,175,175,175,235
,160,160
2070 DATA 160,160,163,163,255,163,163
,160,160
2080 DATA 1245,213,3256,471,52864,639
2090 DATA 7458,879,9658

```


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I'VE been kept busy this month, looking at two rather nice adventures from Level 9, *Snowball and Colossal Cave*, and Ian Watt's book, *Creating Adventure Programs on the BBC Micro*.

Let's start with the games.

BOTH *Snowball* and *Colossal Cave* are massive. *Colossal Cave* has about 200 rooms (70 more than the original) and *Snowball* has 7,000 – but that's mainly done by a clever trick.

In order to handle the vast amount of text in the messages Level 9 has invented an "a-code". How this works they have not revealed, but it must depend on the redundancy of letter and word association.

For example, the letter Q is always followed by the letter U, the most common trigrams (three letter associations) are THE AND THA ENT ION FOR NDE HAS and NCE and, even more remarkable, the fact that 10 words – the, of, and, to, a, in, that, it, is and I – account for over a quarter of English text.

The result is impressive – long, detailed descriptions come up quickly and, almost word for word, are identical to the original *Colossal Cave* text.

Another advantage of the a-code is that it makes it almost impossible to cheat by trying to look at any part of the program.

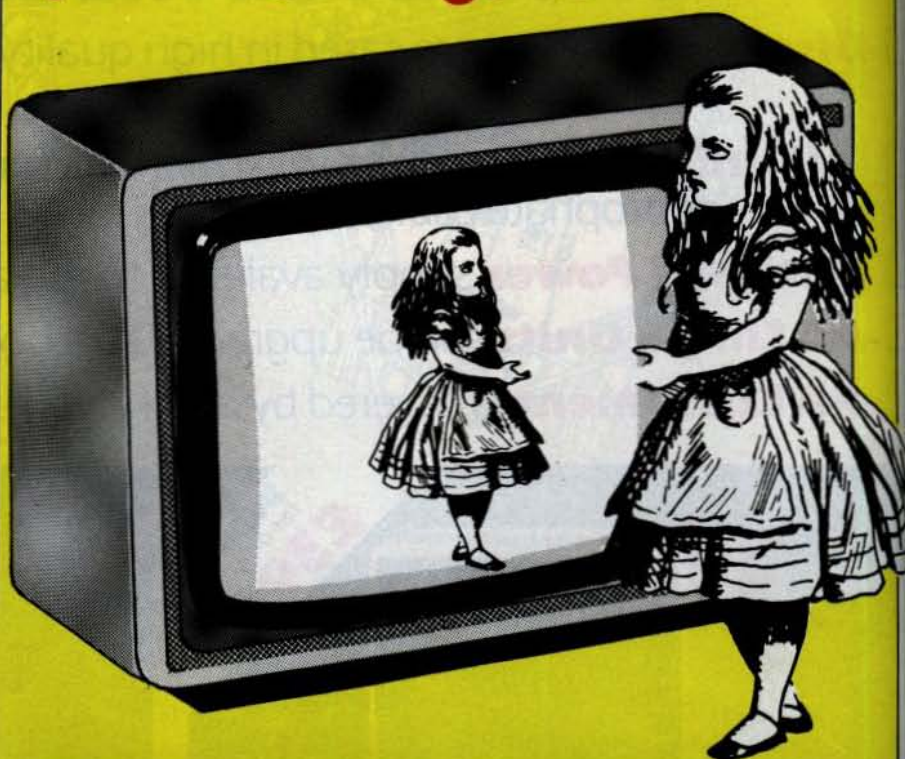
In *Snowball* you wake up in a coffin aboard an enormous interstellar spaceship which has a problem – it is falling into a sun and you are the only person who can save it and the two million passengers it carries.

If you don't take this responsibility very seriously you can actually look in all the two million coffins (one in particular in the Green/Green Green Orange room) but this does take some time and you have to keep dodging some nasty robots.

There are no treasures to collect in



Alice through the VDU



Our monthly foray into Adventure games

this adventure and the way you find out if you are "getting warmer" is to ask for your score after some problem or on reaching a difficult location.

After about three hours I had a fairly good idea what the spaceship looked like (a demountable disc pack was probably the inspiration) and obtained 350 points out of a possible 1,000.

To do this I had got together a spacesuit, obtained a welding lance (how, I can't remember – it required a lot of paper shuffling with two bureaucratic robots so I SAVED the position and don't intend to go near them again) and was outside the ship with a gun and a lamp.

Unfortunately I hadn't sorted out how to get an LL9 battery for the lamp or how to get a spanner – they might be in the DROID STORES but getting in there seemed to be a matter of timing with the DUSBOT.

So here I currently am at the south of the ship. I can see lights to the south where the engines must be but it's another "twisty little maze" which I think I can solve (though rather slowly) by dropping things and then feeling for them.

I've run out of air twice and it's going to be a long haul.

A twisty little maze was one of the

great inventions of Crowther and Woods in the original *Colossal Cave*.

In order to appeal to those who have already got their 350 points in the cave (and been carried off by the jubilant elves) Level 9 has made some tricky alterations and extensions.

The COINS and the FOOD have been moved but, even more testing, you can now only carry four objects, so you can't clear out the cave in just three trips any more.

The old complication of fighting off the psychopathic dwarfs made me adopt a new strategy of dropping the treasures at Y2 and (eventually) shifting them out of the cave with the lamp off.

If you don't do this then the dwarfs and the pirate can waste so much time that your lamp will run out.

I have always preferred to clear out the far end of the cave first and leave the Platinum Pyramid till last. Here the programs differ, because the instant I got the Pyramid the cave began to close and I was unable to get out of the room (let alone the cave) and sort out the last point in Witt's End.

So the cave closed with most of the treasures at Y2 and the new "final problem".

Level 9 has been a lot fairer here because you are given a good hint about

how to start solving this new ending.

However, once you take the hint the cave begins to flood with water and you are faced with mapping another "twisty little maze", and this time you have to keep doing a RESTORE to a SAVED position about every 10 moves else you drown.

Level 9 estimates that it will take the average player two weeks to solve Snowball, with four weeks for Colossal Cave. As you can see I have solved neither of them because I haven't had the time to slog through the two new mazes.

Whenever you reach a maze you have, essentially, to discover a password made up from known letters (usually N,S,E,W,U and D) but of unknown mix and length.

Dropping objects and seeing (or feeling) them again tells you that the last direction you chose was wrong. This speeds up the solution but you still have to solve the maze by trial and error and the fewer objects you have the longer it will take to discover the pathword.

Now in the old Colossal Cave you could carry just enough objects to mark your trail from the start to the exit of the Pirate's maze and this was also the longest trail, so it was quite fair to expect people to solve it.

However, the Level 9 version, by restricting the player to only four objects, makes the Pirate's maze very much harder to solve. This new water maze, with its limited time for exploration before you have to RESTORE, reduces the game to almost random guessing (unless I've missed something).

So what I propose to do is reveal the pathword of the Pirate's maze but, for those who still want to solve the problem themselves, I have used the following program to encode the solution:

```
10 INPUT LINE hint$
20 FOR P=LEN(hint$) TO 1 ST
EP -1
30 char$=MID$(hint$,P,1)
40 IF char$=" " THEN PRINT
" "; ELSE PRINT CHR$(ASC(char$
)+P-32);
50 NEXT P
```

and the coded result is:

N BD QG <;CGFE6 4B05; *4 @*:,74

Incidentally, decoding this message requires rather more than changing +P-32) to -P+32) in line 4 - that is, 40 of the encoder.

I also propose to offer an adventure solving service to any readers who are



stuck. Send in the name of the game and your query and we will publish a selection of them, inviting other readers to send us the answer (in clear preferably, and don't be clever with leading spaces). These answers will then be published in the above code.

I don't think adventure publishers should object to this proposal. In fact it might be a good idea for them to provide a similar service.

And, by the way, could any reader tell me how to get through the Snowball web and the drowning maze? Sorry to be so boring, but I don't play these games for fun.

Finally a plug for Level 9. These games are superb value for money and set a new level for adventure writers which many amateurs will find impossible to compete with.

Two other Level 9 Adventures are currently on sale and a sequel to Snowball is promised. Buy them all, and it should take about six months to sort them out.

And if all this questing has given you the urge to write your own games, you might wish to consult Ian Watt's Creating Adventure Programs on the BBC Micro.

Buyers of this book - published by Interface and Addison Wesley - will have an immediate problem to solve on the second page: "All rights reserved. No part of this publication may be reproduced ... in any form ... without prior written permission of the publisher".

This is a very strong *caveat emptor*, and yet the book is only value for money

if the buyer (or his kids) can and is prepared to type in the programs listed in the book because, although the three adventure listings have obviously been carefully prepared, the supporting text is full of misprints, waffle and errors.

I had the impression that the author had spent 90 per cent of his time on the programs and then dashed off the book as quickly as possible, having never even seen the proofs.

I disagreed immediately with the foreword by Tim Hartnell, who says: "Once you've mastered the tricks of the adventure writing trade which are revealed in this book ..."

Actually Watt doesn't claim that he will reveal (all) the tricks. In fact he makes it quite clear that his games are rather limited in that they only accept simple VERB OBJECT commands.

He also limits how many objects you can carry, which is reasonable, but also limits how many objects can be dropped in a "room".

Now a "room" in an adventure can be the middle of a desert so this restriction is not reasonable. Watt states that twisty mazes (that is, GO NORTH then GO SOUTH and you're not back



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From Page 97

in the same place) "is a poor technique in programming" and then admits even poorer technique.

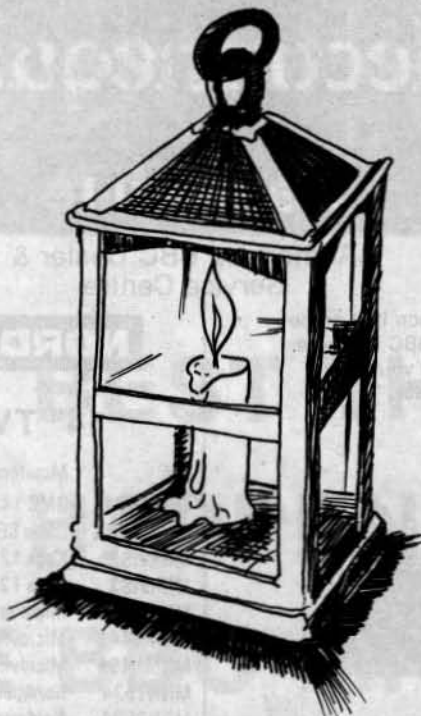
Actually "twisty little mazes" do send me round the bend because, without a listing, they are often a boring slog to solve, but I will leave them, and their solution, to another review.

All of the adventures are based on "logical maps" – they can be drawn in two dimensions with no overlapping passages.

In Chapter 2 he presents a simple example in order to describe his techniques for laying out such maps, their contents and how the program "understands" the commands, moves between the rooms and manipulates the objects.

If you have no idea how to do this yourself then this chapter is well worth reading, but you have to be careful because there are at least five spelling mistakes in the text, numerous errors in the lines of program that you are invited to type in (after, I presume, you have obtained permission from the publisher) and strange sentences like (bottom of page 29):

"When writing programs, full instructions are necessary in most cases, since anyone loading a certain



program would be able to work out the basis of the program without too much confusion" which (even replacing the "would" with "should") caused me much confusion.

Some of the errors in the program lines are amusing because the poor typesetter has obviously become utterly baffled by his task.

For example he uses inverted commas for string double quotes thus "—" and hasn't a clue what to use when he meets a single quote – see Page 25 where the poor man eventually just mixes them randomly and also makes two errors with the full stop.

Fortunately this is all about adventures, so it's up to you, the reader, to sort out what you should really type.

Although I have seen far worse ways of laying out a map and its connections I don't particularly like Watt's technique either.

He associates the four ways out of a room (N,S,E and W only – again an odd restriction) with four offsets which can be positive, negative or zero.

If a non-zero direction is chosen then the new room number = old room number + offset.

Much simpler to understand and expand is the form:

```
1001 DATA "You are in Room 1 -- ",2
,0,0,0
1002 DATA "You are in Room 2 -- ",3
,-1,0,0
```

This could simulate a portcullis or a rockfall etc. preventing you from returning South to Room 1 until you did

something, for example PULL LEVER or THROW DYNAMITE.

Such a command, if acceptable, would set an "override" in one of four variables allowing a negative direction to be taken.

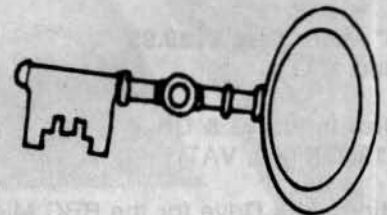
I give the above alternative to show that there is nothing sacrosanct about Watt's techniques. He freely admits this himself, and encourages the reader to develop his own ideas and techniques.

Chapters three and six contain two adventures which could be CHAINED into one large game and then be comparable to many adventures selling in the shops for about £10.

A bonus is that Watt discusses how to convert his programs to other micros, an important skill for anyone with pretensions to being a programmer.

You must always be wary of the text (by Page 61 the typesetter has even given up using any spaces in sentences) but at this stage most people should just type in the programs from the listings.

Chapter seven discusses possible improvements for adventures of the



future and is surprisingly unimaginative – mere mechanical improvements with Space Invader overtones.

Chapter eight invites you to write your own adventure from a rough plan and plot, but anyone capable of performing this exercise would be better employed designing their own story.

And finally there are two appendices and solutions to the three adventures.

If you intend to type in the games I would suggest that you Sellotape these pages shut because it's more fun to solve the problems from the listings.

As an incentive, why not try to beat the number of moves that Watt gives in his solutions to the three games (62, 185 and 170)?

All in all a book that is full of ideas and enthusiasm for the subject and, ironically, should inspire many people to write much better adventures.



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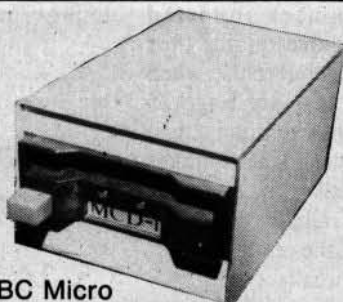


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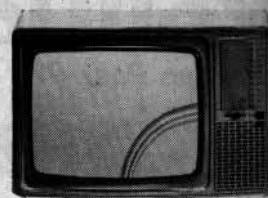
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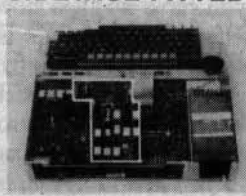
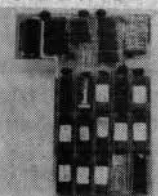
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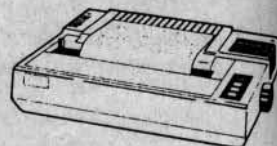
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MU3

STAR PRODUCTS FROM PACE!

★ TOOLSTAR – AN ESSENTIAL UTILITY FOR THE BBC MICRO

This exciting new toolkit ROM offers many extra facilities and will significantly reduce program development time. The new commands offered by Toolstar are:

★ FIND

Search a BASIC program for all occurrences of the specified string (mixed tokens/ASCII), and list all lines with string highlighted.

★ OPEN

Smart renumber parts of a BASIC program.

★ FKEY

Display what is behind function keys in a format suitable for on-screen editing.

★ RESET

An unforgettable new!

★ DFORMAT

Format a disc to the Acorn standard with any number of tracks within the capabilities of the Drive.

★ REPLACE

Selective replacement of one string by another in a BASIC program, including wild card options.

★ FLIST

List a 'Bad Program' with suspicious areas highlighted.

★ FIX

Repair a 'Bad Program' then list it.

★ CONV

Convert between Decimal, Hexadecimal

and Binary in any combination.

★ DVERIFY Verify a disc.

★ DLOAD

Load the data from the specified sector on a disc to memory.

★ EXTEND

Expands the Toolstar to encompass RAM based utilities which then automatically appear under the ★ HELP command. This feature ensures that Toolstar is capable of future expansion.

★ DSAVE

Save the data from memory to a specified area on the disc.

The following commands are directed at the whole machine memory and complement the BBC micro's assembler:

★ MROM

All the M (Memory) commands can be directed at the specified paged ROM. eg. BASIC, DFS, TOOLSTAR, WORDWISE, etc.

★ MDUMP

Hexadecimal/ASCII dump of memory with on-screen editing.

★ MSEE

Fill the specified memory area with any value.

★ MCOMP

Compare memory areas and list those where memory contents are not the same.

★ MBRK

Installs a serial BRK handler giving CPU register and stack displays together with program counter and paged ROM value when BRK occurred — can be used in machine code or BASIC.

★ MDIS

Full feature disassembler with parallel ASCII display. Features include automatic labelling of Acorn O.S. calls and vectors, and on-screen editing.

★ MFIN

Search memory for all occurrences of specified machine code/ASCII string.

★ MCOPI

Smart memory copy from one area to another.

★ MCRC

Calculate a Cyclic Redundancy Check for the specified memory area.

Any or all of the above commands can be used from within a BASIC program. This allows the user to develop many powerful utilities (ie. disc doctor etc.)

Also included are ★ HELP menus with a list of the above commands and their correct syntax.

Toolstar comes complete with a most comprehensive manual including many program examples.

ONLY £34.00 inc. VAT.

★ COMMSTAR – ROM BASED INTELLIGENT COMMUNICATIONS FACILITY

Commstar is a unique intelligent communications facility, developed by Andy Hood, for the BBC micro. It will allow communication with other computer users and allow access to Prestel and other large data bases throughout the world via a suitable modem.

Commstar is extremely flexible, allowing full configuration of the RS 423 (RS 232) part of the BBC micro, full XON/XOFF protocol, and 'safe' file transfer by the use of enhanced 'Christiansen' protocols.

All commands are easily accessed from a main menu from which it is a simple matter to toggle into 'chat' mode (and vice-versa).

Menu options available are:

B — Copy to buffer on/off: All input from the host may be copied into a memory buffer which is approx. 23K in mode 7.

L — Load buffer from current filing system file for transmission to modem.

S — Save buffer to current filing system file for 'browsing' later.

V — View current buffer contents on screen — display speed may be varied, or paused with optional dumping to printer.

T — Toggle screen mode: normally

Commstar also contains its own software clock in memory which is useful in displaying length of log-on time etc.

Details of the above products can be obtained from your nearest BBC dealer or direct from:

mode 7, 80 columns available in mode 3.

O — Output buffer to modem — speed may be varied to suit particular modem speeds.

M — Issue any MOS command from within COMMSTAR eg. *FX8,3 (ie set RS423 baud rate).

C — Exit menu to 'chat' mode to allow conversational access to bulletin boards.

W — Wipe buffer prior to use of other buffer commands if necessary.

E — Echo on/off — set echo on when using host terminals which do not provide an echo.

X — Toggle XON/XOFF protocol.

R — Reset buffer pointers.

I — Initialise RS423 port for word length, parity and stop bits.

F — File transfer using XMODEM protocols. High integrity via use of enhanced 'Christiansen' protocols.

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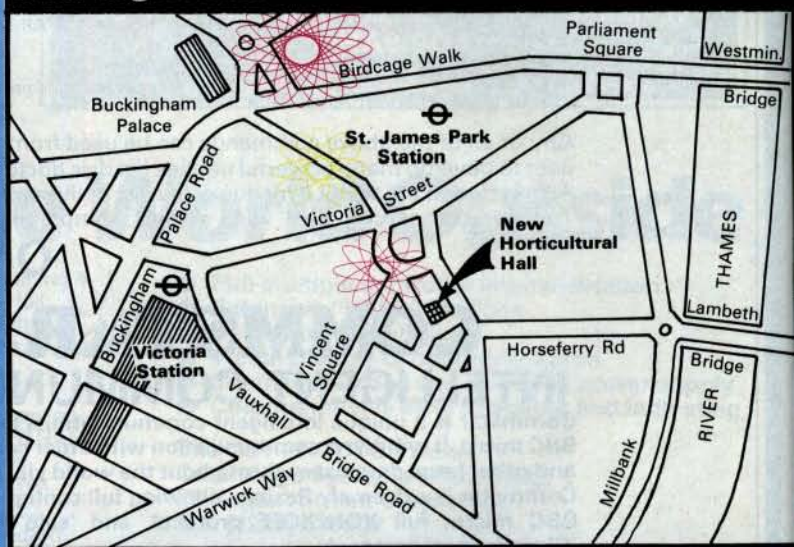
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Intercept the 3D aliens and save planet Earth

Cylon Attack

A&F Software

ISN'T it always the same? The mother ship carrying urgently needed supplies to Earth is attacked and you're the only interceptor pilot on board.

They're swooping out of space, wave after relentless wave, determined to stop the ship getting through.

Well, an interceptor pilot has to do what an interceptor pilot has to do, so within seconds you're launching into space.

Away from the safety of the mother ship you have to destroy as many of the enemy as you can before your shields give way or your fuel runs out.

Your eyes search the long range scanners for a glimpse of the Cylons before they swoop to attack, curving and weaving to avoid your defence systems.

That's the scenario for Cylon Attack, the compulsive new game from A&F. You play the part of the interceptor pilot, struggling to get the Cylon ships in your sights so your lasers can lock on to them.

The screen of your micro becomes the view from the cockpit of the interceptor. Ranged around it are the instruments which show you the state of the lasers, your fuel, your rates of turn and spin, and a long range radar scanner.

Unlike some games this scanner isn't just decoration but really does help you

to track down and destroy the enemy.

The 3-D effect has to be seen to be believed. The aliens loom out of deep space, growing larger as they close to attack distance.

Also there are funny things out there in outer space! I wonder who's in the telephone box that floats past the cockpit?

The game is excellent, with lots more features than can be described here. The graphics leave most other games standing. And, as usual from A&F, the instructions are simple but thorough.

They also give you the option of saving the high score in a special table and will pay £200 to the person who has the highest genuine score by the end of March, 1984.

The only real problem is that I can't find anything about it to criticise. I've seen it entrance people who normally despise computer games.

It really is that good, and sets a new standard for action games set in space. Thoroughly recommended.

Trevor Roberts

Get your specs on!

3 Deep Space

Postern

WOULDN'T it be nice to be able to create games in real three-dimensional space instead of on a boring, flat, two-dimensional television or monitor screen?

Just imagine what a future version of Space Invaders might be like, with the alien craft advancing from far out in deep space as your own short range strike craft weave in and out through the asteroid belt preparing for the last defence...

Unfortunately, we are still waiting for

3-D TV and the closest we have come so far is to fool the brain into thinking that it is viewing a 3-D scene which is in fact made up of two superimposed images, one for each eye.

A necessary part of the deception is for the viewer to wear a pair of specially tinted glasses, usually with one blue and one red lens.

This is what Postern Software have attempted to do for the BBC computer with a simpler version of the scenario that I imagined earlier, entitled 3 Deep Space.

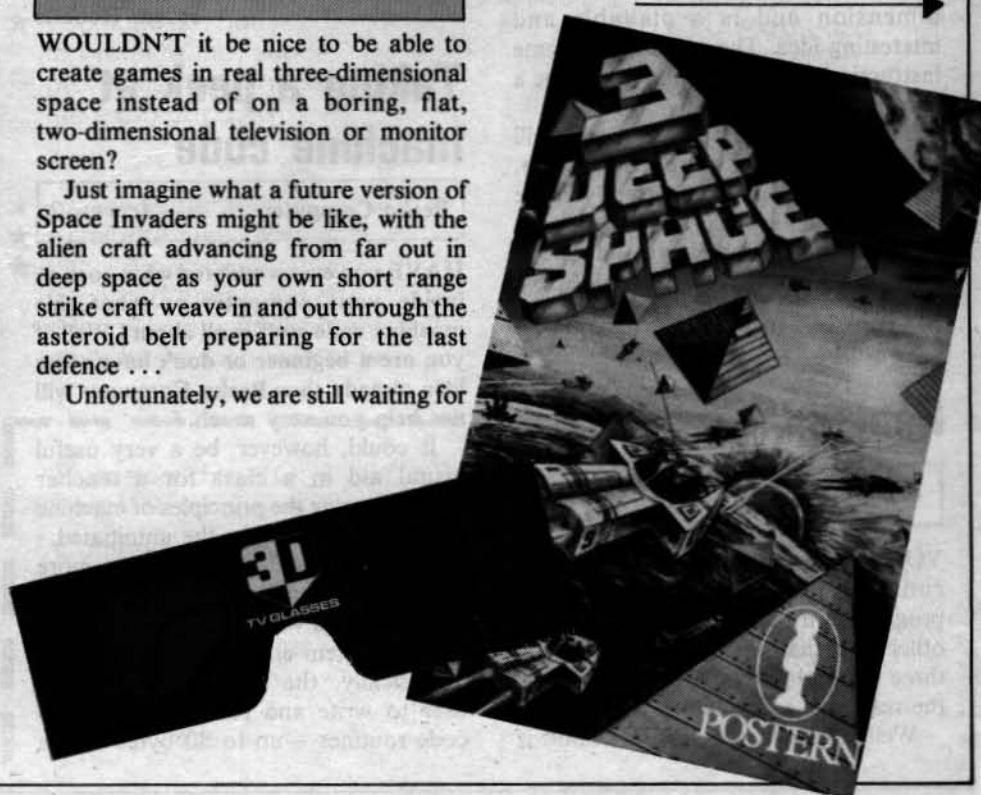
The game is supplied with one pair of 3-D glasses, so while it is being played only the person at the keyboard can see the correct stereoscopic image.

As far as I could see — no pun intended — this seemed to make the bystanders even more anxious to play!

It is important that this game is played on a colour TV set or monitor, otherwise the 3-D effects would not be visible.

The scene is the surface of the home planet, on which, to enhance the three dimensional effect, two rows of pyramids recede into the depths of your television.

In the foreground, a few other, less



From Page 107

discernible, objects are visible. Above these, and to the left, your own craft is positioned, ready to defend against the approaching waves of aliens.

These advance in twos and threes from the opposite side of the surface, very much like Space Invaders turned on its side.

However, this game is in 3-D, remember, so you have the added complication that the alien craft can move in and out across the planet surface as well as towards you.

That is, they move in and out of the television as well as moving from right to left.

To combat the alien movements you, too, can move in a similar fashion and of course you are armed with the obligatory laser which is used to shoot down the approaching ships.

You should avoid their ships, as you're destroyed if a collision occurs.

If things get too hectic you could always use one of your limited supply of smart bombs to clear the screen of the marauding invaders and give yourself a brief respite.

In the early stages of the game, the aliens appear as diamond shaped craft which harmlessly fly past if you do not shoot them down.

These are then followed by successively more aggressive ships, beyond which, I'm afraid, I've not progressed.

I think that the game represents the first commercial step into the third dimension and is a playable and interesting idea. The provision of some instructions on how to play would be an enhancement!

I don't believe that 3 Deep Space will take the games world by storm, however, as there are currently more enjoyable games available in two dimensions, which have advanced beyond the ageing concept of Space Invaders.

Phil Rubini

Penguin's problems

Pengo

H.Soft

YOU'D think by now people would be running out of ideas for games programs. In fact someone told me the other day that there were only really three original games programs and all the rest were variants of them.

Well maybe "Pengo" from H.Soft is

the fourth, because it's certainly different from any others I've seen.

The idea is that you have control of a cute little penguin called Pengo who lives in a maze of ice cubes. The problem is that he's not alone.

There are some rather unpleasant creatures called Snobeas who enjoy eating the ice cubes. They also vary their diet with the odd Pengo or two!

The poor little bird has to run around the maze, dodging the Snobeas and hiding behind ice cubes. As they're eating the ice cubes this gets quite difficult after a while.

Happily, it's not all one-sided as Pengo can push an ice cube over a Snobeas and freeze it.

And, if an unwary Snobeas gets too close to the edge of the maze, Pengo can stun him by pushing on the side of the walls.

I know that the story line doesn't make all that much sense. But who cares when the game's as much fun as Pengo?

The graphics and sound are outstanding and the game gives you the choice of using the keyboard or joysticks.

You can also freeze the program — no joke intended — while you go off to have a cup of coffee and calm down.

It's fast and furious, the sort of game that keeps you having "just one more go" while someone is telling you that it's their turn.

If you want an arcade game that's original and entertaining, with a lovable penguin thrown in for free, then Pengo is the one for you.

Trevor Roberts

Taking a peek at machine code

Peeko-Computer

Acornsoft

HAVE you ever wondered what goes on inside your computer or what this machine code stuff is all about? Well, if you are a beginner or don't have some idea already then Peeko-Computer will not help you very much.

It could, however, be a very useful visual aid in a class for a teacher demonstrating the principles of machine code programming to the uninitiated.

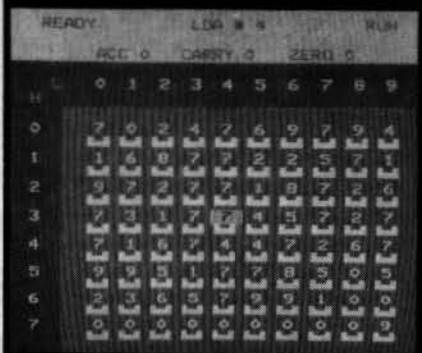
It is also handy for someone more experienced, enabling the user to try out short routines without having to suffer endless system crashes.

Basically, the program allows the user to write and run short machine code routines — up to 80 bytes — of a

ACORN SOFTWARE EDUCATION

Peeko-Computer

for the BBC Microcomputer Models A and B



simple numerical nature and see their display on the screen.

The program is available on cassette or disc. I tried out the cassette version, which was up to Acornsoft's usual high standard of packaging and ease of use.

The pack consists of a short loader program, the main program (about 5k), five short demonstration files and a 21 page instruction manual.

All programs and files loaded perfectly every time and it was very easy to create, save and load one's own pseudo machine code routines.

I say pseudo machine code because some of the 20 assembler mnemonics available in the program — 10 of which can be used at any one time — were not identical to the 6502 instruction set as used by the BBC and all were given an arbitrary decimal code.

In fact this program avoids hexadecimal altogether, which may not be a bad idea for the beginner but it does mean having to learn machine code "properly" all over again.

The routines described in the booklet all worked very well indeed and the display was perfectly intelligible on a black and white TV as well as in colour.

The user can single step through a routine and watch the results appear, as well as run it in fast mode.

A warning though: Scanning through the code with the cursor can be confusing as individual instructions are often misinterpreted, giving unexpected mnemonics at the top of the screen.

Overall, Peeko-Computer should be useful to instructors and those already knowing what machine code is all about, though the latter may well prefer one of the fully blown monitor programs with more facilities that are available for the same price.

Mike Mahon

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- ARIES-B20 -



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VARIABLES AND PROCEDURES

Lines:
130 PROCsound Plays sound displayed.
180 PROCkey Determines which key is pressed.
270 PROCdirection Which way to move the arrow.
520 PROCupdown Which way to increment parameter.
1280 PROCsetup Sets up and prints screen layout.
1480 PROCinit Sets all the variables at start of program.
1560 PROCinstruct Sets first screen, and asks if instructions are required.

EXPERIMENT with the effects of ENVELOPE on SOUND with our Mode 7 envelope generator.

It shows you all the parameters of the SOUND and ENVELOPE commands allowing you to change them with ease and play the result.

All the parameters are displayed on the screen and you use the cursor keys to increase or decrease any of them.

Pressing the S key will play the sound and pressing A will get rid of it if it bores you, or drives the rest of the family mad.

The rest is up to you. Have fun!

VARIABLES

ENVELOPE variables: T%, P1%, P2%, P3%, PN1%, PN2%, PN3%, AA%, AD%, AS%, AR%, ALA%, ALD%

SOUND variables: C%, A%, P%, D%

OX%, OY% Old co-ords of arrow.
X%, Y% Co-ords of arrow.
arrow\$ Three character shapes to make up arrow.
choice% Position of arrow
val\$ Value of the parameter determined by choice%.

All other variables are for working loops.

Soundshaper listing

```

1 REM*** Sound Experimenter ***
2 REM*** By A.J.Reynolds ***
3 REM*** For THE MICRO USER ***
10 MODE7
20 PROCinstruct:CLS
30 #FX4,1
40 PROCinit:PROCsetup
50 VDU23;11;0;0;0;0
60 REPEAT
70 #FX15,1
80 Z=INKEY(100)
90 IF Z>0 PROCkey:PROCdirection
100 UNTIL FALSE
110 END
120 *****
130 DEFPROCsound
140 ENVELOPE1,T%,P1%,P2%,P3%,PN1%,
    ,PN2%,PN3%,AA%,AD%,AS%,AR%,ALAX,ALD%
150 SOUND C%,A%,P%,D%
160 ENDPROC
170 *****
180 DEFPROCkey
190 IF INKEY=26 choiceX=choiceX-1:IF
    choiceX<1 choiceX=17:ENDPROC
200 IF INKEY=122 choiceX=choiceX+1:IF
    choiceX>17 choiceX=1:ENDPROC
210 IF INKEY=58 PROCupdown(1)
220 IF INKEY=42 PROCupdown(-1)
230 IF INKEY=66 SOUND&0011,0,0,1:SOUN
    D&0010,0,0,1
240 IF INKEY=82 PROCsound
250 ENDPROC
260 *****
270 DEFPROCdirection
280 OX=X:OY=Y
290 ON choice% GOSUB 340,350,360,370
    ,380,390,400,410,420,430,440,450,460,4
    70,480,490,500
300 PRINTTAB(OX,OY);CHR$137;" "
    ;
310 PRINTTAB(OX,OY);CHR$136;CHR$149;
    arrow$;
320 ENDPROC
330 *****
340 X=1:Y=5:RETURN
350 X=7:Y=5:RETURN
360 X=12:Y=5:RETURN
370 X=17:Y=5:RETURN
380 X=22:Y=5:RETURN
390 X=27:Y=5:RETURN
    
```


From Page 113

```

400 XZ=32:YZ=5:RETURN
410 XZ=3:YZ=12:RETURN
420 XZ=8:YZ=12:RETURN
430 XZ=13:YZ=12:RETURN
440 XZ=18:YZ=12:RETURN
450 XZ=24:YZ=12:RETURN
460 XZ=29:YZ=12:RETURN
470 XZ=6:YZ=22:RETURN
480 XZ=11:YZ=22:RETURN
490 XZ=16:YZ=22:RETURN
500 XZ=21:YZ=22:RETURN
510 *****
520 DEFPROCupdown(incZ)
530 ON choiceZ GOSUB 580,620,660,700
,740,780,820,860,900,940,980,1020,1060
,1100,1140,1180,1220
540 IFLEN(val$)<4 REPEAT val$=" "+va
l$:UNTILLEN(val$)=4
550 PRINTTAB(XZ+1,YZ+1)val$;:PRINTTA
B(XZ+1,YZ+2)val$;
560 ENDPROC
570 *****
580 TZ=TZ+(incZ)
590 IFTZ>127 TZ=127
600 IFTZ<1 TZ=1
610 val$=STR$(TZ):RETURN
620 PI1Z=PI1Z+(incZ)
630 IFPI1Z>127 PI1Z=127
640 IFPI1Z<-127 PI1Z=-127
650 val$=STR$(PI1Z):RETURN
660 PI2Z=PI2Z+(incZ)
670 IFPI2Z>127 PI2Z=127
680 IFPI2Z<-127 PI2Z=-127
690 val$=STR$(PI2Z):RETURN
700 PI3Z=PI3Z+(incZ)
710 IFPI3Z>127 PI3Z=127
720 IFPI3Z<-127 PI3Z=-127
730 val$=STR$(PI3Z):RETURN
740 PN1Z=PN1Z+(incZ)
750 IFPN1Z>255 PN1Z=255
760 IFPN1Z<0 PN1Z=0
770 val$=STR$(PN1Z):RETURN
780 PN2Z=PN2Z+(incZ)
790 IFPN2Z>255 PN2Z=255
800 IFPN2Z<0 PN2Z=0
810 val$=STR$(PN2Z):RETURN
820 PN3Z=PN3Z+(incZ)
830 IFPN3Z>255 PN3Z=255
840 IFPN3Z<0 PN3Z=0
850 val$=STR$(PN3Z):RETURN
860 AAZ=AAZ+(incZ)
870 IFAAZ<-127 AAZ=-127
880 IFAAZ>127 AAZ=127
890 val$=STR$(AAZ):RETURN
900 ADZ=ADZ+(incZ)
910 IFADZ<-127 ADZ=-127
920 IFADZ>127 ADZ=127

```

```

930 val$=STR$(ADZ):RETURN
940 ASZ=ASZ+(incZ)
950 IFASZ<-127 ASZ=-127
960 IFASZ>127 ASZ=127
970 val$=STR$(ASZ):RETURN
980 ARZ=ARZ+(incZ)
990 IFARZ<-127 ARZ=-127
1000 IFARZ>127 ARZ=127
1010 val$=STR$(ARZ):RETURN
1020 ALAZ=ALAZ+(incZ)
1030 IFALAZ<0 ALAZ=0
1040 IFALAZ>126 ALAZ=126
1050 val$=STR$(ALAZ):RETURN
1060 ALDZ=ALDZ+(incZ)
1070 IFALDZ<0 ALDZ=0
1080 IFALDZ>126 ALDZ=126
1090 val$=STR$(ALDZ):RETURN
1100 CZ=CZ+(incZ)
1110 IFCZ<0 CZ=0
1120 IFCZ>1 CZ=1
1130 val$=STR$(CZ):RETURN
1140 AZ=AZ+(incZ)
1150 IFAZ<-15 AZ=-15
1160 IFAZ>1 AZ=1
1170 val$=STR$(AZ):RETURN
1180 PZ=PZ+(incZ)
1190 IFPZ<0 PZ=0
1200 IFPZ>255 PZ=255
1210 val$=STR$(PZ):RETURN
1220 DZ=DZ+(incZ)
1230 IFDZ>255 DZ=255
1240 IFDZ<1 DZ=1
1250 val$=STR$(DZ):RETURN
1260 *****
1270 *****
1280 DEFPROCsetup
1290 RESTORE1330:FORZ4Z=1TO8:READz1Z,
z2Z
1300 FORZ3Z=0TO1
1310 PRINTTAB(0,z1Z+z3Z);CHR$141;CHR$
(z2Z);
1320 NEXT,
1330 DATA0,129,3,130,6,129,10,130,13,
129,17,129,20,130,23,129
1340 RESTORE1360:FORZ1Z=1TO3:READz2Z
1350 PRINTTAB(0,z2Z);CHR$136;CHR$149;
:NEXT
1360 DATA5,12,22
1370 RESTORE1390:FORZ=1TO8:READz1Z,z
2Z,z3Z
1380 FORYZ=0TO1:PRINTTAB(z1Z,z2Z+YZ);
Z$;:NEXT,
1390 DATA13,0,"ENVELOPE 1,"
1400 DATA5,3,"T PI1 PI2 PI3 PN1
PN2 PN3"
1410 DATA5,6,"1, 0, 0, 0, 0,
0, 0,"
1420 DATA6,10,"AA AD AS AR AL
A ALD"

```

```

1430 DATA7,13,"0, 0, 0, 0, 0
0"
1440 DATA15,17,"SOUND"
1450 DATA10,20,"C A P D"
1460 DATA10,23,"1, 1, 0, 1"
1470 *****
1480 DEFPROCinit
1490 N5=1:TX=1:PI1Z=0:PI2Z=0:PI3Z=0:P
N1Z=0:PN2Z=0:PN3Z=0:AAZ=0:ADZ=0:ASZ=0:
ARZ=0:ALAZ=0:ALDZ=0
1500 choiceZ=1:arrow$=CHR$184+CHR$163
+CHR$228
1510 CZ=1:AZ=1:PZ=0:DZ=1
1520 XZ=1:YZ=5:DXZ=3:OYZ=5
1530 PRINTTAB(3,YZ)arrow$;
1540 ENDPROC
1550 *****
1560 DEFPROCinstruct
1570 CLS
1580 FORYZ=0TO1:PRINTTAB(0,1+YZ)CHR$1
41;CHR$132;CHR$157;CHR$131;SPC7;"SOUND
EXPERIMENTER.":NEXT:PRINTTAB(10,4);C
HR$129;"By:- A.J.Reynolds."
1590 FORYZ=0TO1:PRINTTAB(6,14+YZ)CHR$
141;CHR$129;"Do You want Instructions?
":NEXT
1600 *FX15,1
1610 REPEAT:YZ=BET:UNTILYZ=890RYZ=78
1620 IFYZ=78:ENDPROC
1630 CLS
1640 PRINT"TAB(5);"This program is d
esigned to aid"" the selection of EN
VELOPE and SOUND"" statements."
1650 PRINT;CHR$132;CHR$157;CHR$130;SP
C12;"OPERATION."
1660 PRINT"TAB(5)"Use the LEFT and R
IGHT cursor keys"" to move, the arro
w Left and Right."
1670 PRINTTAB(5)"Use the UP and DOWN
cursor keys to"" Increase or Decrease
the parameter."
1680 PRINTTAB(5)"The 'S' Key to play
the displayed"" parameters."
1690 PRINTTAB(5)"The 'A' Key to Abort
."
1700 PRINTTAB(5)"When you have found
a particular"" combination You need.
Make a note of"" ALL the red displa
y."
1710 PRINT"TAB(1);CHR$129;"ENVELOPE1,
T,PI1,PI2,PI3,PN1,PN2,PN3,"CHR$129;"
AA,AD,AS,AR,ALA,ALD"
1720 PRINTTAB(1);CHR$129;"SOUNDC,A,P,
D"
1730 PRINT"<any key>...";
1740 *FX15,1
1750 YZ=BET:ENDPROC

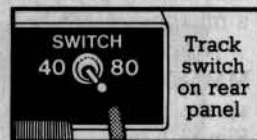
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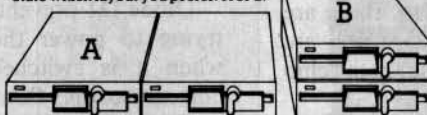


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Trouble with the BBC Micro's built-in timepiece is that it has such a shocking memory...

It's high

THE pots were flying in the Cook household. I had committed the heinous crime of forgetting a birthday. The accusation was hurled, "You spend so long staring at that micro, it's a pity it couldn't remind you".

"There's a thought", I mused, and this caused a temporary loss of concentration which allowed a cold wet dish cloth to strike me on the back of the neck.

The BBC Micro already has a real time clock built into it. The only trouble is that every time the computer is switched off, it forgets what time it is.

Also a time given in hundredths of a second is not very user-friendly. What is needed is a clock that never stops and that can remember the date as well.

So I set to it, designing a real time clock/calendar add-on board for the user port.

There are several real time clock ICs on the market, all of them are designed to be connected to the bus structure of a microprocessor, so what I needed was one that could be tricked into thinking that the user port of the BBC Micro was a microprocessor bus.

National Semiconductor's MM58174A was the prime candidate, so the design was based on this chip. Figure I shows the pin-out of this IC.

You will see there are four data lines (D0-D3) which are used to read and write data to the chip. Also, there are four address lines (A0-A3) which are used to specify which register in the chip to read and write to.

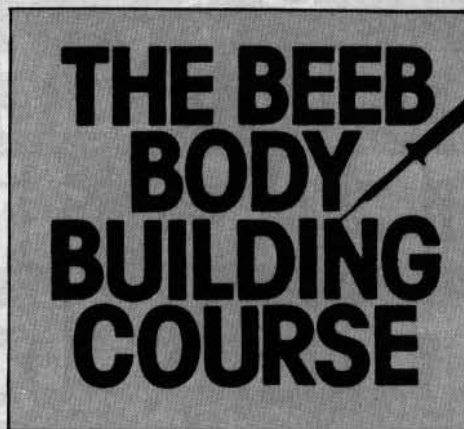
In addition there is a read line ($\overline{RD}$), a write line ($\overline{WR}$) and a chip enable ($\overline{CE}$). The chip enable is an input that turns the device on so that it is ready for data transfer.

The bar over the top of the name indicates that a logic zero is required in order for the line name to be true.

For example, the chip is only enabled when the $\overline{CE}$ line is at logic zero. When this line is a logic one the chip is not enabled.

This useful convention is very widely used and informs you instantly what polarity of signal is needed.

The other lines of this device supply it with power, signal an interrupt and enable the quartz crystal to be added to



PART 12

provide the time reference.

On the user port we have only eight data input/output lines, and even by pressing control line 2 into service as an output we are still short of one output.

The answer is to multiplex the address and data information through the same four lines, leaving four lines for the control lines.

This requires the address information to be written to a latch just before we access the real time clock IC.

The full circuit is shown in Figure II. IC2 is the real time clock IC. It is powered from the computer when it is turned on, and by a Nicad battery when it is not.

Diode D1 prevents this battery from trying to power the whole computer when it is switched off. Remember, current can only flow one way through a diode. When the computer is turned on, the battery is trickle-charged through

resistor R1 which limits the current to about 1mA.

Diode D2 provides a low resistance path when the battery is powering the clock. The quartz crystal is attached to pins 14 and 15, and a small trimmer (variable capacitor) provides fine adjustment of the time keeping.

The data input/output connections are taken to the least significant four bits of the user port. These lines are also taken to IC1, a four-bit latch.

A latch is a circuit which takes a snapshot of the logic levels on its input and preserves them on its output. The event which triggers the snapshot for this IC is the rising edge of the clock signal (pin 9).

So, whenever this line makes the transition from a logic zero to a logic one, whatever is on the latch's four inputs is frozen and transferred to its four outputs.

As these outputs are connected to the address lines of the real time clock IC, we talk of "clocking the address into the latch".

The only remaining function required is to set the read, write and chip select lines to their appropriate levels. This could be done directly by using the four remaining lines.

However, there would be a possibility that these lines might, owing to other software running, get themselves into a state where the real time clock was being told to read and write at the same time.

This is obviously a chip-destroying combination and so IC3 is used to make sure this can never happen.

This IC is a decimal decoder: when any decimal number is applied (in binary form) to its inputs, the corresponding output goes low.

For example, suppose the combination 0110 were applied to the inputs, then output number six would have a logic zero on it and all the other outputs would have a logic one on them.

Thus this IC ensures there is never a Read signal and a Write signal present at the same time. The cost of this protection is very small and so I thought it worthwhile to incorporate it.

The chip enable is connected directly to bit 7, and not through IC3, as it needs to be held low at the same time as a

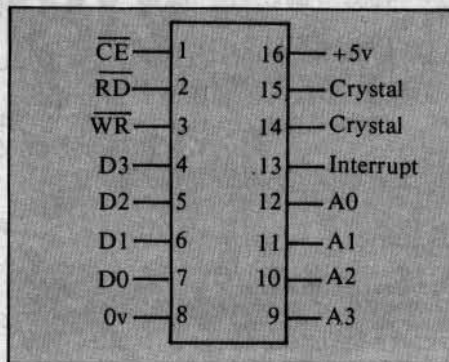


Figure I: Pinout of the MM58174A real time clock

MIKE COOK joins the Time Lords

You've read the game... now play the book...

MY SECRET FILE

Program by Phil Nathans

Based on the best-selling Puffin book by John Astrop

A personal database for your darkest thoughts.

Do you have secrets you wouldn't even confide to your closest friend? Let alone your family?

Do you have secrets about your friends and family you wouldn't confide to anyone but yourself?

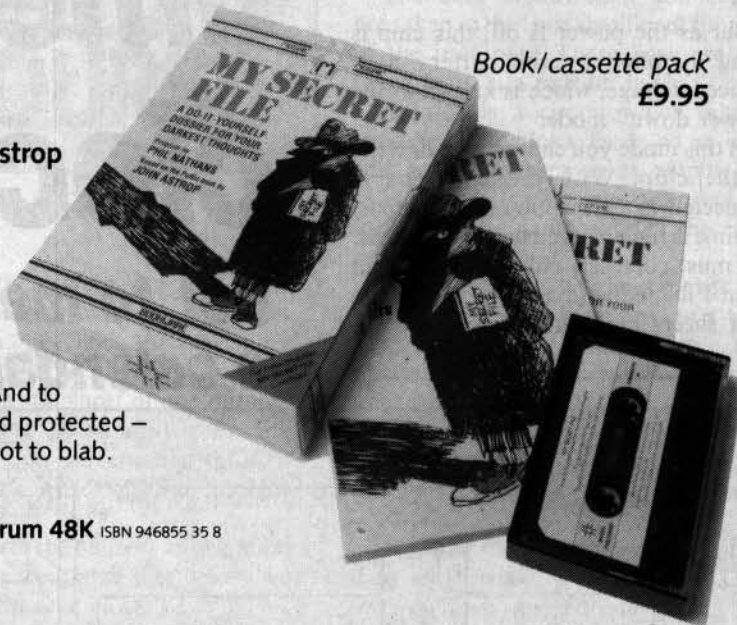
At last, you're no longer alone. **My Secret File** turns your personal computer into a personal confidante. And to keep your confidences confidential, it's even password protected – because these days, you can't even trust your micro not to blab.

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By special arrangement with an unspecified alien culture, Mosaic will let you have the story along with the program – so at least you're in with a chance.

Please read the story carefully . . . because we'd like to release our Spring SF bookware blockbuster (Harry Harrison's *Stainless Steel Rat* on micro for the first time!) before you carelessly unleash contra-energy across the universe. Thank you.

Available for the: **Spectrum 48K** ISBN 946855 15 3 **BBC Micro B** ISBN 946855 20 X

Available from good bookshops and computer stores.

Published by Mosaic Publishing Ltd

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BOOKWARE

From Page 117

problem. It took several hours of head scratching to work out why the time was the same after switching on as it was on powering down.

At one stage I was going to incorporate this as a feature. Have you noticed that most "features" are really design errors?

This project could then have been entitled "An elapsed time indicator", measuring how long the computer had been switched on to give an indication of when maintenance was due.

Also, when the board was disconnected from the computer it proceeded to update the time normally, so it was ideal as a rental meter as well. Those of you who want this "feature" should just leave out the transistor.

The two resistors in the base circuit of

the transistor are to stop the same effect occurring when the computer is switched off but the disc drives are turned on.

When this happens, about one volt is present on this user port line which would be sufficient to turn the transistor on if it were not for R2 and R3 (I didn't know about that either before this project).

The real time clock IC is capable of generating an interrupt signal, so this is connected to control line one.

All the components plus a printed circuit board are available in Body Build Pack No. 9. (See Page 122.)

To connect this to the computer you need a ribbon cable with two IDC (Insulation Displacement Cable) sockets which are available as Body Build Pack No. 2.

Details about connecting the cable to the sockets were given in the July 1983 issue of *The Micro User*. Pack No. 9 simply requires soldering up, remembering to place the ICs and diodes the right way round.

The component reference numbers are printed on the board, so you can't really go wrong.

Like all hardware add-ons this requires software to drive it. I have written a number of machine code routines that may be incorporated into any program.

Also there is a routine that will display the date and time in the top left hand corner of the screen whatever mode you are using. This is driven by interrupts and can be left running while another Basic program is running.

I have assembled these routines to sit in the RS432 buffer as I seldom use this feature. However they may be placed anywhere in memory.

The full program also incorporates a routine to enable you to set up the clock with the correct time. Once set, it need never be altered again.

However, having said that, my wife complained that during development of this project I kept getting up in the middle of the night to check it was keeping good time. That's my story and I am sticking to it!

Table I shows the internal register locations of the real time clock chip. Note that some locations are Read Only, some are Write Only but most are Read/Write.

These locations contain the time and date as well as controlling the operation of the clock. Most of these registers are self-explanatory, but a few might need a little clarification.

Register 0 will place the chip into a test mode. This will feed clock pulses to

THE BEEB BODY BUILDING COURSE

various stages of the internal counters much faster than is normal. Thus you do not have to wait four years to test if it adds an extra day to February in leap years.

In this application we do not require this, and so for normal operation a zero must be written in bit 3 in this register. The years register is a Write Only register. It is used to count down the years until a leap year comes along. The Interrupt register is used to set the frequency while the real time clock IC generates an interrupt. Table II summarises these registers.

Essentially, the computer has to generate a sequence of pulses to access these locations. The program is shown in the listing and, as it contains rather a lot of machine code it will need a little more explanation than most. DO NOT PANIC (please note the large friendly letters).

The machine code portion is written as a series of subroutines and the operation is best understood by looking at these separately.

As mentioned before, the address and data information sent to the real time clock chip are passed over the same lines, so we need a subroutine that will select an address.

Lines 300-420 contain a subroutine to do just this: it is called REGSEL, short for Register Select.

The address to be latched is first salted away on the stack for use later, and lines 320 and 330 make all the user port lines outputs. Then the address is recovered from the stack (340) and the four most significant bits are cleared (350).

Bit 4 is set to one (360) and sent to the user port. Then bit 4 is cleared (380) and sent to the user port.

The effect of this is to give the latch a pulse and so store the address information. As, after selecting an address we wish to read or write to it, lines 510 and 520 enable the chip.

Figure III shows the sequence of events required to write to an IC

Register	Contents	Read or Write	Page Zero
0	Test mode/run	W	—
1	Tenths of seconds	R	&70
2	Units of seconds	R	&71
3	Tens of seconds	R	&72
4	Units of mins	R/W	&73
5	Tens of mins	R/W	&74
6	Units of hours	R/W	&75
7	Tens of hours	R/W	&76
8	Units of days	R/W	&77
9	Tens of days	R/W	&78
10	Day of week	R/W	&79
11	Units of months	R/W	&7A
12	Tens of months	R/W	&7B
13	Years	W	
14	Stop/start	W	
15	Interrupt	R/W	

Table I: The real time clock internal registers

YEAR REGISTER	
Value	Meaning
8	Leap year
4	Leap year + 1
2	Leap year + 2
1	Leap year + 3
INTERRUPT REGISTER	
Value	Meaning
0	No interrupts
1	Interrupt after 0.5 second
9	Interrupt every 0.5 second
2	Interrupt after 5.0 seconds
10	Interrupt every 5.0 seconds
4	Interrupt after 60 seconds
12	Interrupt every 60 seconds
START/STOP	
Value	Meaning
0	Stop
1	Start
TEST MODE	
Value	Meaning
0	Normal running
8	Test mode

Table II: Special registers in the real time clock

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location. This is typical of the timing diagram for many microprocessor components, so it will be quite educational if you can follow what is happening.

The subroutine to write to a register is contained in lines 430-530. The location is assumed to be in the accumulator and the value to be written is in the X index register.

The subroutine first calls the register-select subroutine which we first looked at. Then it transfers the value to be written into the accumulator and cleans it up (450, 460).

Bits 6 and 7 are set (470) to enable the chip and activate the write line. The write line is then de-activated (490) and finally the chip is disabled.

Using this subroutine, we can write to any IC location in the real time clock.

Most of the time however, we wish to read the time from the clock. The subroutine JUST1 (200-290) will read just one location in the IC.

This subroutine assumes the address has been selected and the chip enabled by the REGSEL routine before it is entered.

It first makes the four least significant bits of the user port into inputs (200, 210) and then activates the read line on the IC (220).

It then gets the data (240) and stores it into the Y index register (260). It then "cleans up" the signals by de-activating the read line and disabling the IC.

In order to read all the time and date values, subroutine REGREAD (100-190) transfers all the relevant registers into page zero memory.

The memory may then be examined by use of the indirection instructions. This is useful if you require any part of the time or date in numeric form.

Table I shows the page zero locations where each register is stored. For most applications, the date will be most useful in the form of a string. This is stored starting at a memory location represented by the variable DATE.

Thus it can be accessed by the string indirection operator. For example the command:

PRINT \$DATE

will print the string containing the date.

This string is updated by calling the UPDATE subroutine in lines 770-940. This takes the values stored in page zero and converts them into Ascii values (900).

They are then stored in the string previously set up in lines 1410-1430. For simplicity, this only updates the time and not the day and date. So if you

are burning the midnight oil you could be misled.

The subroutine DISTIME is used to display this string in the top left-hand corner of the display.

Using the operating system call, it first gets the current position of the cursor and stores it on the stack (540-600). Then the cursor is moved to the top of the screen (610) and the string is printed (620-690).

The cursor is then restored to its original position (700-760). The printing routine used will go directly to the screen and will not be directed to the printer if it is switched on.

All the previous routines can be called explicitly from your program, but it is possible to make the real time clock IC generate an interrupt at intervals and use this to automatically display the time and date.

This should be used with caution, as some of the machine-operating system calls made are not fully re-entrant.

This means that, if the interrupt occurs while the computer is executing one of these routines and the interrupt routine calls the same routine, the computer will get its under-garments in a twist.

The only time I have seen this happening is when trying to edit a line with the real time clock display on.

The subroutine IRQSR (interrupt request service routine) will handle all the interceptions of any interrupt generated, and take the appropriate action if it is the real time clock causing it.

The main task of dealing with the real

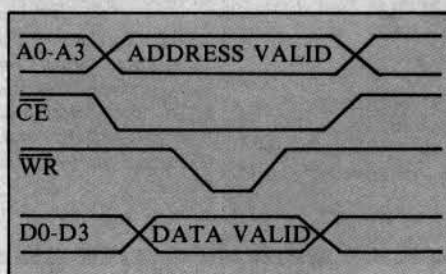


Figure III: Write cycle waveforms

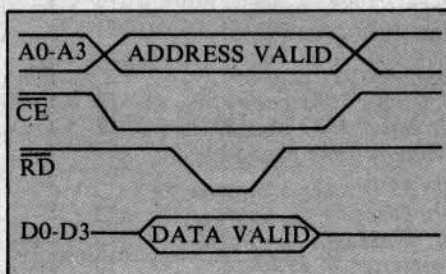


Figure IV: Read cycle waveforms

THE BEEB BODY BUILDING COURSE

time clock is handled in the subroutine START.

The interrupt is first cleared by writing a zero to the real time clock's interrupt register and then by reading it three times. (Don't ask me why, it just says that in the data sheet.)

The display is updated (1150) and the interrupt timer is set to generate another interrupt in half a second.

The real time clock is capable of timing to a tenth of a second. But I have not included this in the display as I am only updating the display every half a second.

It is possible to get the real time clock to interrupt at other time intervals by writing a different number to register 15. See Table II.

The rest of the program initialises memory locations needed by these machine code routines and programs two function keys to start and stop the automatic display.

Note that the call address is given in hex rather than as a variable name. This allows the program to be deleted and a new one run, and the keys will still work.

The procedure at the end of the program allows the initial setting of the clock (1560-2090). This need only be entered once as the time should be maintained after that.

However, when crossing international date lines and coping with the clocks going forwards and backwards it will need to be used. The year is needed to see if it is a leap year, but it cannot be read.

This program must be run once on power-up to initialise the computer. This could easily be called from a !BOOT file for those of you with discs.

If you have tape, remember it will only be necessary to run this program if you want to use the real time clock. If not, then just leave it attached, as the computer will be charging up its batteries.

A fine adjustment may be made on

+ p8&p

+ p&p

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the time keeping properties of this board by use of the small trimmer. If the trimmer is closed up (more of the two plates overlapping) then the clock will run slower, opened up it will run faster.

This adjustment is very fine and the effects will only be noticed over several days.

Having built the basic board and written the driving software, it can now be incorporated into your own programs.

Imagine a program that scans a data base and tells you of any birthdays in the coming week, or one that works out the number of shopping days to Christmas. (Not another one already-Ed.)

How about the ultimate in desk diaries that will store your appointments and remind you when to put your best suit on?

The computer could even be

programmed to give you cheery little messages if powered up on your birthday or on holidays, or inform you that you should be getting paid at double-time rate.

If you have a speech synthesiser fitted, you can have your very own speaking clock! Write in and tell me what you will be using it for and we will publish the best ideas and programs.

That's all for now, but watch out for something very different in our first anniversary issue.

Body Build Pack No 9 consists of: IC1 74LS175 Quad edge-triggered latch; IC2 MM58174A Real-time clock; IC3 74LS42 Decimal decoder; D1 & D2 1N4148 diode; C1 5pf to 65pf variable capacitor; T1 BC182 transistor; R1 & R2 1k resistor; R3 & R4 3k9 resistor; X1 32.768kHz miniature watch crystal; B1 3.6v PCB mounting

Ni-Cad battery; 20 Way IDC straight solder tail plug; one printed circuit board; three 16-pin IC sockets.

Note - you will also need Pack No 2 or similar.

● You can order this pack and previous ones with the order form on Page 122.

Beeb Body Building Clock listing

```
10 PRINT "The Beeb Bodybuilding
   Course"
20 PRINT "Feb 1984"
30 PRINT "HARDWARE REAL TIME CLOCK
   & CLANDER"
40 PRINT "By Mike Cook"
50 NVEC=&80
60 FOR A% = 0 TO 2 STEP 2
70 P% = &A00
80 I
90 OPT A%
100 .REGREAD LDX #1
110 .LOOP TXA
120 JSR REGSEL
130 JSR JUST1
140 TYA
150 STA &6F,X
160 INX
170 CPX #13
180 BNE LOOP
190 RTS
200 .JUST1 LDA #&F0
210 STA &FE62
220 LDA #&A0
230 STA &FE60
240 LDA &FE60
250 AND #&F
260 TAY
270 LDA #&00
280 STA &FE60
290 RTS
300 .REGSEL
310 PHA
320 LDA #&FF
330 STA &FE62
```

```
340 PLA
350 AND #&F
360 OR A #&10
370 STA &FE60
380 AND #&EF
390 STA &FE60
400 LDA #&80
410 STA &FE60
420 RTS
430 .WRREG
440 JSR REGSEL
450 TXA
460 AND #&F
470 OR A #&C0
480 STA &FE60
490 AND #&8F
500 STA &FE60
510 LDA #&00
520 STA &FE60
530 RTS
540 .DISTIME
550 LDA #134
560 JSR &FFF4
570 TYA
580 PHA
590 TXA
600 PHA
610 LDA #30
   :JSR &FFBC
620 LDA #0
   :STA &7E
```

```
630 .MORE LDY &7E
640 LDA (&7C),Y
650 JSR &FFBC
660 INC &7E
670 LDA &7E
680 CMP #19
690 BNE MORE
700 LDA #31
710 JSR &FFBC
720 PLA
730 JSR &FFBC
740 PLA
750 JSR &FFBC
760 RTS
770 .UPDATE
780 JSR REGREAD
790 LDY #11
800 LDX #&76
810 .LOOP2 JSR COPY
820 JSR COPY
830 INY
840 CPX #&70
850 BNE LOOP2
860 JSR DISTIME
870 RTS
880 .COPY
890 LDA 0,X
900 OR A #&30
910 STA (&7C),Y
920 DEX
930 INY
940 RTS
950 .TROSR
960 LDA &FE6D
```

This listing is included in this month's cassette tape offer. See order form on Page 137.

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```

970 ROL A
    :ROL A
980 ROL A
    :ROL A
990 BCC CONT
1000 TXA
    :PHA
1010 TYA
    :PHA
1020 LDA &FE6D
1030 OR A &#10
1040 STA &FE6D
1050 JSR START
1060 PLA
    :TAY
1070 PLA
    :TAX
1080 .CONT JMP (&80)
1090 .START
1100 LDA #15
    :LDX #0
    :JSR WRREG
1110 LDA #15
    :JSR REGSEL
1120 JSR JUST1
1130 JSR JUST1
1140 JSR JUST1
1150 JSR UPDATE
1160 LDA #15
    :LDX #1
    :JSR WRREG
1170 RTS
1180 .DATE
1190 J
1200 NEXT
1210 ?&7C=DATE MOD 256
1220 ?&7D=DATE DIV 256
1230 DATA Sun,Mon,Tue,Wed,Thr,Fri
    ,Sat
1240 DATA Jan,Feb,Mar,Apr,May,Jne
    ,Jly,Aug,Sep,Oct,Nov,Dec
1250 DIM DAY$(7),MONTH$(12)
1260 FOR A=1 TO 7
1270 READ DAY$(A)
1280 NEXT
1290 FOR A=1 TO 12
1300 READ MONTH$(A)
1310 NEXT
1320 PRINT "DO YOU WANT TO RESET THE
    CLOCK"
1330 A$=GET$
1340 IF A$="Y"
    THEN PROC_SETUP
1350 FOR B=1 TO 3
1360 AZ=15
1370 CALL REGSEL
1380 CALL JUST1
1390 NEXT
1400 CALL REGREAD

```

```

1410 T$=DAY$(?&79)+ " "+MONTH$(?&7B)*1
    0 +?&7A)+ " "+CHR$(?&78 OR &30)+
    CHR$(?&77 OR &30)+ " "+CHR$(?&76
    OR &30)+CHR$(?&75 OR &30)+
    ":"+CHR$(?&74 OR &30)+CHR$(?&73
    OR &30)
1420 T$=T$+" "+CHR$(?&72 OR &30)+
    CHR$(?&71 OR &30)
1430 $DATE=T$
1440 IF (?&206=IRQSR MOD 256)
    AND (?&207=IRQSR DIV 256)
    THEN 1480
1450 ?&80=?&206
    :?&81=?&207
1460 ?&206=IRQSR MOD 256
1470 ?&207=IRQSR DIV 256
1480 ?&FE6C=?&FE6C AND &EF
1490 ?&FE6E=?&FE6E OR &10
1500 *KEY 0 CALL &AC4 1M
1510 *KEY 9 XZ=0
    :AZ=15
    :CALL &A411M
1520 PRINT "FUNCTION KEY 0 WILL START
    THE DISPLAY"
1530 PRINT "FUNCTION KEY 9 WILL STOP
    THE DISPLAY"
1540 PRINT "THE DISPLAY MUST BE STOPED
    FOR EDITING"
1550 END
1560 DEF PROC_SETUP
1570 REPEAT
1580 XZ=0
    :AZ=14
    :CALL WRREG
1590 XZ=0
    :AZ=0
    :CALL WRREG
1600 REPEAT
1610 INPUT "INPUT THE YEAR",YEAR
1620 IF YEAR < 1980
    THEN PRINT "LIVING IN THE DARK
    AGES THEN"
1630 UNTIL YEAR > 1979
1640 YEAR=YEAR-1979
1650 XZ=16
1660 REPEAT
1670 XZ=XZ DIV 2
1680 IF XZ=0
    THEN XZ=8
1690 YEAR=YEAR-1
1700 UNTIL YEAR=0
1710 AZ=13

```

```

    :CALL WRREG
1720 INPUT "INPUT THE MONTH NUMBER"
    ,MONTH
1730 IF MONTH < 1 OR MONTH > 12
    THEN 1710
1740 XZ=MONTH DIV 10
1750 AZ=12
    :CALL WRREG
1760 XZ=MONTH MOD 10
1770 AZ=11
    :CALL WRREG
1780 INPUT "INPUT THE DAY OF THE MONTH"
    ,DMONTH
1790 IF DMONTH < 1 OR DMONTH > 31
    THEN 1770
1800 XZ=DMONTH DIV 10
1810 AZ=9
    :CALL WRREG
1820 XZ=DMONTH MOD 10
1830 AZ=8
    :CALL WRREG
1840 INPUT "INPUT DAY NUMBER (SUNDAY=1
    )",DAYNUM
1850 IF DAYNUM < 1 OR DAYNUM > 7
    THEN 1830
1860 XZ=DAYNUM
1870 AZ=10
    :CALL WRREG
1880 INPUT "INPUT THE HOUR (24 HOUR
    MODE)",HOUR
1890 IF HOUR < 0 OR HOUR > 23
    THEN 1870
1900 XZ=HOUR DIV 10
1910 AZ=7
    :CALL WRREG
1920 XZ=HOUR MOD 10
1930 AZ=6
    :CALL WRREG
1940 INPUT "INPUT NUMBER OF MINUTES
    PAST THE HOUR",MINS
1950 IF MINS < 0 OR MINS > 59
    THEN 1930
1960 XZ=MINS DIV 10
1970 AZ=5
    :CALL WRREG
1980 XZ=MINS MOD 10
1990 AZ=4
    :CALL WRREG
2000 PRINT
2010 PRINT DAY$(DAYNUM); " the ";DMONTH
    ; " ";MONTH$(MONTH)
2020 PRINT "TIME ";HOUR; ":";MINS
2030 PRINT "IS THIS OK"
2040 A$=GET$
2050 UNTIL A$="Y"
2060 PRINT "PRESS SPACE BAR TO START"
2070 A$=GET$
2080 XZ=1
    :AZ=14
    :CALL WRREG
2090 ENDPROC

```

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July issue of The Micro User.



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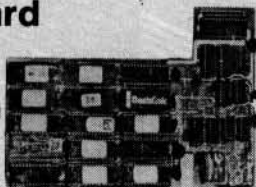
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Alien Invasion listing

From Page 69

```

5 REM (c) The Micro User
10 ENVELOPE 1,5,0,0,0,6,3,3,127
   ,-5,-5,-5,120,60
20 ENVELOPE 2,1,-12,-1,-1,6,3,3
   ,127,0,0,-5,26,100
30 ENVELOPE 3,1,-26,-36,-45,255
   ,255,255,127,0,0,-127,80,0
40 ENVELOPE 4,1,0,0,0,0,0,0,127
   ,-1,-10,-10,100,20
50 ON ERROR GOTO 4340
60 *TV 255
70 MODE 7
   :VDU 23;B202;0;0;0;
80 DIM A$(20),B$(20),C$(20),D$(20)
   ,E$(20),B1$(3),B2$(3),B4$(10)
   ,AA$(3),AP$(2),A(13),TT$(5)
90 PROCTITLE
   :DIM NAME$(10),HSCORE$(10),HS(10)
   :YZ=0
100 FOR JZ=1 TO 10
   : NAME$(JZ)="....."
   :HSCORE$(JZ)=1000
   :
   :NEXT
110 SCOREZ=0
   :YZ=0
   :FOR JZ=1 TO 10
   :HS(JZ)=128
   :NEXT
120 AZ=0
   :BZ=0
   :CZ=0
   :DZ=0
   :EZ=0
   :FZ=0
   :GZ=0
   :HZ=2+YZ
   :LZ=HIMEM + ((2+YZ)*40)
   :NZ=0
   :RZ=0
   :SZ=0
   :TZ=0
   :UZ=0
   :VZ=0
   :WZ=0
   :FZ=0
130 A1Z=0
   :B1Z=0
   :C1Z=0
   :D1Z=0
   :E1Z=0
   :BOMBED=0
140 AAZ=1
   :BBZ=1
   :CCZ=1
   :DDZ=1

```

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July issue of The Micro User.

```

   :EEZ=1
   :LIVEZ=0
150 FOR JZ=1 TO 10
   :B4Z(JZ)=0
   :NEXT
160
170 MMZ=1
   :NNZ=10
   :GLZ=1
   :SGLZ=1
   :GRZ=1
   :SGRZ=1
180
190 CLS
   :PRINT TAB(10,0)SCOREZ
   :AA$(1)="~"
   :AA$(2)="~"
   :AA$(3)="~"
200 PRINT TAB(0,0)CHR$(96);AA$(1);
   "AA$(2);"AA$(3);CHR$(87);
   TAB(22,0)"HIGH SCORE = ";YZ
210 ST=TIME
   :GOTO 1550
220
230 REM **** MOVE BASE AND FIRE
   LASER
240 DEF PROCMOVE
250 IF KZ=1 GOTO 310
260 IF INKEY (-98) NZ=NZ-1
   :GOTO 360
270 IF INKEY (-67) NZ=NZ+1
   :GOTO 360
280 IF FZ>0 GOTO 390
290 IF INKEY (-106) PROCSHOOT
   :GOTO 390
300 GOTO 390
310 IF ADVAL (3)>42000 NZ=NZ+1
   :GOTO 360
320 IF ADVAL (3)<24000 NZ=NZ-1
   :GOTO 360
330 IF FZ>0 GOTO 390
340 X=ADVAL (0) AND 3
   :IF X>0 PROCSHOOT
350 GOTO 390
360 IF NZ<1 NZ=1
370 IF NZ=36 NZ=35
380 PRINT TAB(0,23)CHR$(96);
   TAB(NZ,23)"~"
390 *FX 15,1

```

```

400 ENDPROC
410
420 REM **** ALIENS BOMBS ****
430 DEF PROCBOMBS
440 IF B1$(1)+B1$(2) <> 0 PROCLOWER
   :ENDPROC
450 FOR JZ=1 TO RND(2)
460 B1Z(JZ) = RND(NNZ-(MMZ-1))
470 IF B4Z(B1Z(JZ)+(MMZ-1)) >=5
   GOTO 590
480 IF EZ < 20 GOTO 530
490 IF DZ < 20 GOTO 540
500 IF CZ < 20 GOTO 550
510 IF BZ < 20 GOTO 560
520 GOTO 570
530 IF E$(B1Z(JZ)+MMZ-1) <> "B2Z(
   JZ)=LZ+360
   :GOTO 580
540 IF D$(B1Z(JZ)+MMZ-1) <> "B2Z(
   JZ)=LZ+280
   :GOTO 580
550 IF C$(B1Z(JZ)+MMZ-1) <> "B2Z(
   JZ)=LZ+200
   :GOTO 580
560 IF B$(B1Z(JZ)+MMZ-1) <> "B2Z(
   JZ)=LZ+120
   :GOTO 580
570 B2Z(JZ)=LZ+40
580 B1Z(JZ)=(B1Z(JZ)+3)-1+TZ
   :B2Z(JZ)=B2Z(JZ)+B1Z(JZ)
590 NEXT
600 B3=0
610 PROCLOWER
620 ENDPROC
630
640 REM **** DIRECT BOMBS ****
650 DEF PROCLOWER
660 FOR JZ=1 TO 2
670 IF BOMBED=1 GOTO 790
680 IF B1Z(JZ)=0 GOTO 790
690 IF B3=0 B3=B3+1
   :GOTO 720
700 IF B3=1 AND B1Z(2) > 0 B3=B3+1
   :GOTO 720
710 ?(B2Z(JZ)-40)=32
720 XZ=?(B2Z(JZ))
730 IF B2Z(JZ) < 32664 GOTO 750
740 IF XZ <> 0 AND XZ <> 32 PROCBOMBE
   D
   :PROCMOVE
   :GOTO 780
   ELSE GOTO 780
750 IF XZ=0 OR XZ=32 ?(B2Z(JZ))=124
   :B2Z(JZ)=B2Z(JZ)+40
   :GOTO 790
760 IF XZ=94 ?(B2Z(JZ))=32

```


From Page 127

```

:FZ=0
:GOTO 780
770 IF XZ=255 ?(B2Z(JZ))=97
ELSE ?(B2Z(JZ))=32
780 B1Z(JZ)=0
790 NEXT
800 IF BOMBED=1 BOMBED=0
:GOTO 110
810 ENDPROC
820
830 REM **** HIT BY A BOMB ****
840 DEF PROCBOMBED
850 SOUND 0,2,4,25
860 PRINT TAB(B1Z(JZ)-1,23)CHR$ (&91)
"~)"
870 NT=TIME
:REPEAT UNTIL TIME =NT+100
880 LIVEZ=LIVEZ+1
890 IF LIVEZ < 3 GOTO 930
900 PROCFAME
910 BOMBED=1
920 GOTO 980
930 AA$(LIVEZ)=" "
940 PRINT TAB(0,0)CHR$ (&96)AA$(1)
" ";AA$(2) " ";AA$(3)
950 PRINT TAB(NZ,23) " "
960 NZ=1
:PRINT TAB(0,23)CHR$ (&96) " ~)
"
970 IF FZ>0 PRINT TAB(FZ,6Z) " "
980 FZ=0
990 ENDPROC
1000
1010 REM **** PROCLINE1 - LINE55
PRINT ALIENS
1020 REM **** AAZ TO EEZ = 2 WHEN
COLUMNS SHOT OUT, PRIOR TO
DIRECTION CHANGE.
1030
1040 DEF PROCLINE1
1050 TTZ(1)=TZ
1060 IF AAZ=0 GOTO 1100
1070 AP$=" "
1080 FOR MZ=RZ+GLZ TO RZ+NNZ
:AP$=AP$+A$(MZ)
:NEXT
1090 GOTO 1100
: IF AAZ=2 AP$=MID$(AP$,SGLZ
,31)+" "
1100 PRINT TAB(0,HZ)CHR$ (&94);
TAB(TZ,HZ)AP$
1110 AAZ=0
1120 ENDPROC
1130
1140 DEF PROCLINE2

```

```

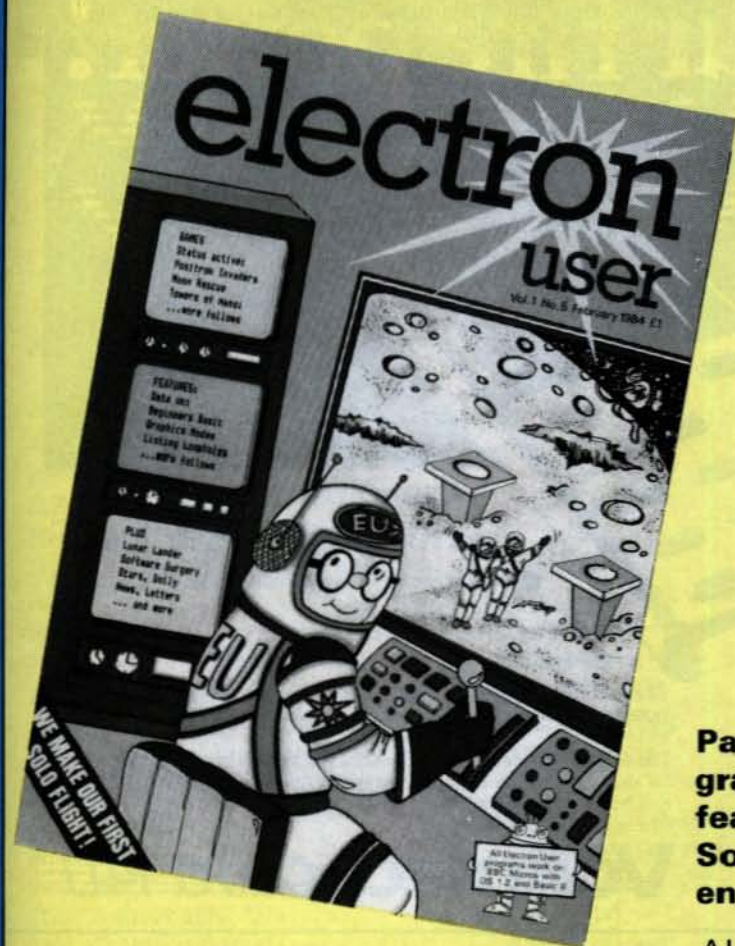
1150 TTZ(2)=TZ
1160 IF BBZ=0 GOTO 1200
1170 BP$=" "
1180 FOR MZ=RZ+GLZ TO RZ+NNZ
:BP$=BP$+B$(MZ)
:NEXT
1190 GOTO 1200
: IF BBZ=2 BP$=MID$(BP$,SGLZ
,31)+" "
1200 PRINT TAB(0,HZ+2)CHR$ (&93);
TAB(TZ,HZ+2)BP$
1210 BBZ=0
1220 ENDPROC
1230
1240 DEF PROCLINE3
1250 TTZ(3)=TZ
1260 IF CCZ=0 GOTO 1300
1270 CP$=" "
1280 FOR MZ=RZ+GLZ TO RZ+NNZ
:CP$=CP$+C$(MZ)
:NEXT
1290 GOTO 1300
: IF CCZ=2 CP$=MID$(CP$,SGLZ
,31)+" "
1300 PRINT TAB(0,HZ+4)CHR$ (&92);
TAB(TZ,HZ+4)CP$
1310 CCZ=0
1320 ENDPROC
1330
1340 DEF PROCLINE4
1350 TTZ(4)=TZ
1360 IF DDZ=0 GOTO 1400
1370 DP$=" "
1380 FOR MZ=RZ+GLZ TO RZ+NNZ
:DP$=DP$+D$(MZ)
:NEXT
1390 GOTO 1400
: IF DDZ=2 DP$=MID$(DP$,SGLZ
,31)+" "
1400 PRINT TAB(0,HZ+6)CHR$ (&91);
TAB(TZ,HZ+6)DP$
1410 DDZ=0
1420 ENDPROC
1430
1440 DEF PROCLINE5
1450 TTZ(5)=TZ
1460 IF EEZ=0 GOTO 1500
1470 EP$=" "
1480 FOR MZ=RZ+GLZ TO RZ+NNZ
:EP$=EP$+E$(MZ)
:NEXT
1490 GOTO 1500
: IF EEZ=2 EP$=MID$(EP$,SGLZ
,31)+" "
1500 PRINT TAB(0,HZ+8)CHR$ (&95);
TAB(TZ,HZ+8)EP$
1510 EEZ=0
1520 ENDPROC

```

```

1530 REM **** SET UP ALIENS IN PRINT
STRINGS PRIOR TO MAIN SECTION
****
1540
1550 FOR IZ=1 TO 10
1560 A$(IZ)="e "
1570 NEXT
1580 FOR IZ=11 TO 20
1590 A$(IZ)="zu "
1600 NEXT
1610 FOR IZ=1 TO 10
1620 B$(IZ)="zu "
1630 NEXT
1640 FOR IZ=11 TO 20
1650 B$(IZ)="e "
1660 NEXT
1670 FOR IZ=1 TO 10
1680 C$(IZ)="a "
1690 NEXT
1700 FOR IZ=11 TO 20
1710 C$(IZ)="~" "
1720 NEXT
1730 FOR IZ=1 TO 10
1740 D$(IZ)="~" "
1750 NEXT
1760 FOR IZ=11 TO 20
1770 D$(IZ)="a "
1780 NEXT
1790 FOR IZ=1 TO 10
1800 E$(IZ)="i6 "
1810 NEXT
1820 FOR IZ=11 TO 20
1830 E$(IZ)="g; "
:NEXT
1840
1850 PRINT TAB(0,20)CHR$ (&92);
1860 FOR IZ=1 TO 4
1870 PRINT " x"CHR$ (&FF)CHR$ (&FF)
CHR$ (&FF)"t ";
1880 NEXT IZ
1890 PRINT TAB(0,21)CHR$ (&92);
1900 FOR IZ=1 TO 4
1910 PRINT " "CHR$ (&FF)CHR$ (&FF)
" "CHR$ (&FF)CHR$ (&FF)" ";
1920 NEXT IZ
1930
1940 REM **** PRINT BASE AT START
***
1950 PRINT TAB(0,23)CHR$ (&96) " ~)
"
1960
1970 REM **** PREPARE ALIEN DIRECTION
1980 PROCDIRECT
1990 IF RZ=10 RZ=0
ELSE RZ=10
2000 AAZ=1

```

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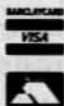
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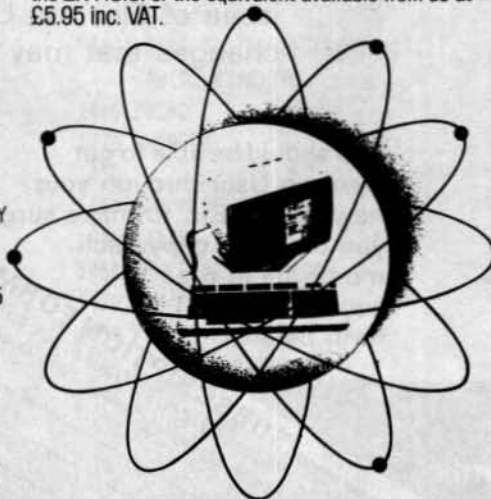
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MANUFACTURERS AND DESIGNERS OF
 MICROCOMPUTER PERIPHERALS

9 Bonchurch Road, PORTSMOUTH,
 Hampshire PO4 8RY. Telephone (0705) 823825.

For International Enquiries (0705) 754160. Prestel Account No. 705-823825

Alien Invasion listing

From Page 128

```

:BBZ=1
:CCZ=1
:DDZ=1
:EEZ=1
2010 TZ=UZ
      :IF AZ<20 PROCLINE1
2020 IF BZ<20 PROCLINE2
2030 IF CZ<20 PROCLINE3
2040 IF DZ<20 PROCLINE4
2050 IF EZ<20 PROCLINE5
2060
2070 REM **** MAIN SECTION ****
2080
2090 TZ=UZ
2100 REPEAT
2110 TZ=TZ+WZ
2120 IF TIME -ST >= 1000 PROCMSHIP
2130 IF SZ>2 AND SZ<33 PROCMSHIP
2140 IF EZ>19 GOTO 2170
2150 PROCLINE5
2160 PROCMOVE
      :PROCHIT
2170 IF DZ>19 GOTO 2220
2180 NT=TIME +10-(TZ*3)
      :REPEAT PROCMOVE
      :PROCHIT
      :UNTIL TIME >=NT
2190 PROCLINE4
2200 PROCMOVE
      :PROCHIT
2210 IF SZ>2 AND SZ<33 PROCMSHIP
2220 IF CZ>19 GOTO 2270
2230 NT=TIME +10-(TZ*3)
      :REPEAT PROCMOVE
      :PROCHIT
      :UNTIL TIME >=NT
2240 PROCLINE3
2250 PROCMOVE
      :PROCHIT
2260 NT=TIME +10-(TZ*3)
      :REPEAT PROCMOVE
      :PROCHIT
      :UNTIL TIME >=NT
2270 IF BZ>19 GOTO 2290
2280 PROCLINE2
2290 PROCMOVE
2300 PROCHIT
2310 IF AZ>19 GOTO 2330
2320 PROCLINE1
2330 NT=TIME +10-(TZ*3)
      :REPEAT PROCMOVE
      :PROCHIT
      :UNTIL TIME >=NT
2340 NT=TIME +10-(TZ*3)
2350 SOUND 3,2,HZ*2,5
2360 PROCHIT

2370 PROCMOVE
2380 IF SZ>2 AND SZ<33 PROCMSHIP
2390 REPEAT PROCMOVE
2400 PROCHIT
2410 UNTIL TIME >=NT
2420 IF WZ=-1 AND TZ=1 IF B4Z(GLZ)=5
      :SGLZ=SGLZ+3
      :GLZ=GLZ+1
      :TZ=TZ+3
      :AAZ=2
      :BBZ=2
      :CCZ=2
      :DDZ=2
      :EEZ=2
2430 IF WZ=1 AND TZ=VZ IF B4Z(NNZ)=5
      :VZ=VZ+3
      :NNZ=NNZ-1
      :GOTO 2110
2440 UNTIL TZ=VZ
2450 GOTO 1980
2460
2470 REM **** DIRECTION AND HEIGHT
      OF ALIENS ****
2480 DEF PROCDIRECT
2490 SGLZ=1
2500 IF B4Z(MMZ) =5 MMZ=MMZ+1
      :GOTO 2500
2510 IF B4Z(NNZ) =5 NNZ=NNZ-1
      :GOTO 2510
2520 GLZ=MMZ
      :GRZ=NNZ
2530 IF VZ > 1 UZ=B+((MMZ-1)*3)+((10-N
      NZ)*3)
      :VZ=1
      :WZ=-1
      ELSE VZ=B+((MMZ-1)*3)+((10-NNZ)*3
      )
      :UZ=1
      :WZ=1
2540 FOR JZ=0 TO 8 STEP 2
2550 IF JZ=0 AND AZ<20 GOTO 2610
2560 IF JZ=2 AND BZ<20 GOTO 2610
2570 IF JZ=4 AND CZ<20 GOTO 2610
2580 IF JZ=6 AND DZ<20 GOTO 2610
2590 IF JZ=8 AND EZ<20 GOTO 2610
2600 GOTO 2620
2610 PRINT TAB(1,HZ+JZ)*
      *
2620 NEXT
2630 HZ=HZ+1
      :LZ=LZ+40
2640 IF AZ=20 AIZ=1
2650 IF BZ=20 BIZ=1
2660 IF CZ=20 CIZ=1
2670 IF DZ=20 DIZ=1
2680 IF EZ=20 EIZ=1
2690 IF EZ < 20 AND HZ=14 GOTO 2740

2700 IF DZ < 20 AND HZ=16 GOTO 2740
2710 IF CZ < 20 AND HZ=18 GOTO 2740
2720 IF BZ < 20 AND HZ=20 GOTO 2740
2730 IF HZ < 22 GOTO 2750
2740 JZ=1
      :BIZ(JZ)=NZ
      :PROCBOMBED
      :PROCBOMBED
      :PROCBOMBED
2750 ENDPROC
2760
2770 REM **** LASER FIRING ****
2780 DEF PROCSHOOT
2790 IF FZ > 0 GOTO 2830
2800 FZ=NZ+1
2810 GZ=22
2820 PROCHITA
2830 PROCHIT
2840 IF FZ = 0 GOTO 2860
2850 PRINT TAB(FZ,GZ)*^
2860 ENDPROC
2870
2880 REM **** CHECK FOR HITS ****
2890 DEF PROCHIT
2900 PROCBOMBS
2910 IF FZ=0 GOTO 2970
2920 PRINT TAB(FZ,GZ)* "
2930 GZ=GZ-1
2940 PROCHITA
2950 IF GZ < 1 FZ=0
      :GOTO 2970
2960 IF FZ > 0 PRINT TAB(FZ,GZ)*^
2970 ENDPROC
2980
2990 REM **** LOOK AT SCREEN POSITIONS
      FOR ALIEN OR LASER - GUN/BOMB
      ****
3000 DEF FNHIT(OZ,PZ)
3010 =?(&7C00+(PZ*40)+OZ)
3020
3030 REM **** HIT ROUTINE CONT. ***
3040 DEF PROCHITA
3050 XZ=FNHIT(FZ,GZ)
3060 IF XZ=0 OR XZ=32 ENDPROC
3070 IF GZ < 20 GOTO 3110
3080 SOUND 0,-10,0,1
3090 IF XZ = 255 PRINT TAB(0,GZ)
      CHR$ (&92)TAB(FZ,GZ)*2"
      :FZ=0
      :ENDPROC
3100
3110 IF XZ=124 OR XZ=120 OR XZ=116
      OR XZ=50 OR XZ=97 PRINT
      TAB(FZ,GZ)* "
      :FZ=0
      :ENDPROC

```


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- C) MERRY MUSIC turns the keyboard into a musical keyboard.
- D) FUNNY FACES presents a line up, which one is the suspect?
- E) FRED THE FROG needs co-ordinated help to get across the pond.
- A) THE POND seems very active today.
- B) SPEED is required to keep the cake on the conveyor belt.
- C) DIRECTIONS seem to be needed by everyone in Orion village.
- D) ORDER the items to set Fred the Frog free.
- E) SID THE SPIDER needs some help to get out of the maze.

For children between 4-8 years of age.

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From Page 131

```

3120 IF GZ=1 PROCMHIT
:GOTO 3170
3130 IF GZ=0 FZ=0
:GOTO 3170
3140 PRINT TAB(FZ-1,GZ) " "
3150 SOUND 0,1,4,10
3160 PROCSCORE
3170 ENDPROC
3180
3190 REM **** MOTHERSHIP ROUTINE
***
3200 DEF PROCMSHIP
3210 IF SZ>1 AND SZ<33 GOTO 3250
ELSE QZ=RND(2)
3220 IF QZ=1 QZ=-2
:SZ=33
ELSE SZ=1
3230 IF ADVAL (-6) <> 0 SOUND 1,3
,255,75
3240 ST=0
3250 PRINT TAB(0,1)CHR$ (&95)TAB(SZ
,1) " x(wt "
3260 SZ=SZ+QZ
3270 IF SZ=1 OR SZ>= 33 ST=TIME
:PRINT TAB(0,1) "
"
3280 ENDPROC
3290
3300 REM **** HIT MOTHERSHIP ? ****
3310 DEF PROCMHIT
3320 *FX21,5
3330 FOR QZ=0 TO 555 STEP 7
:SOUND 1,-15,QZ,0
:NEXT
3340 MSCOREZ=(RND(3)*100)
3350 SCOREZ=SCOREZ+MSCOREZ
3360 PRINT TAB(10,0)SCOREZTAB(0,1)
" TAB(SZ,1);MSCOREZ;" "
3370 ENDPROC
3380
3390 REM ***** SCORING ROUTINE ****
3400 DEF PROCSCORE
3410 L1Z=(GZ-HZ)/2+1
3420 SCOREZ = SCOREZ+((10-(GZ-HZ))*10)
3430 PRINT TAB(10,0)SCOREZ
3440 F3=(FZ-TT*(L1Z))
3450 IF F3 MOD 3 > 0 F3=((F3+((GLZ-1)*
3)) DIV 3)+1
ELSE F3=(F3+((GLZ-1)*3))
DIV 3
3460 B4Z(F3)=B4Z(F3)+1
3470 FOR JZ=1 TO 2
3480 IF L1Z=5 GOTO 3560
3490 IF L1Z=4 GOTO 3550
3500 IF L1Z=3 GOTO 3540
3510 IF L1Z=2 GOTO 3530
3520 A$(F3)=" "
:AZ=AZ+1
:AAZ=1
:GOTO 3570
3530 B$(F3)=" "
:BZ=BZ+1
:BBZ=1
:GOTO 3570
3540 C$(F3)=" "
:CZ=CZ+1
:CCZ=1
:GOTO 3570
3550 D$(F3)=" "
:DZ=DZ+1
:DDZ=1
:GOTO 3570
3560 E$(F3)=" "
:EZ=EZ+1
:EEZ=1
3570 F3=F3+10
3580 NEXT JZ
3590 IF AZ+BZ+CZ+DZ+EZ=100 ZZ=ZZ+1
:CLS
:PRINT TAB(10,10)CHR$ (141);
CHR$ (&81)ZZ*1000;" POINTS"
:PRINT TAB(10,11)CHR$ (141);
CHR$ (&81)ZZ*1000;" POINTS"
:SCOREZ=SCOREZ+ZZ*1000
:NT=TIME
:REPEAT UNTIL TIME =NT+350
:XZ=SCOREZ
3600 IF AZ+BZ+CZ+DZ+EZ=100 SCOREZ=XZ
:GOTO 120
3610 FZ=0
3620 ENDPROC
3630
3640 REM *****
3650 DEF PROCTITLE
3660 PROCTUNA
3670 A$=" ALIEN INVA
SION "
3680 PROCTUNE
3690 FOR A=1TO 2
:PRINT TAB(0,A)CHR$ (&84);
CHR$ (157);CHR$ (&91);CHR$ (&88)
:NEXT
3700 FOR A=4 TO 29
:FOR B=1 TO 2
3710 PRINT TAB(4,B)CHR$ (141)RIGHT$(A$
,A);CHR$ (140)CHR$ (&89)"x(wt"
3720 NEXT
:FOR AA=1TO 100
:IF ADVAL (-6)=15 PROCTUNE
3730 NEXT
:NEXT
3740 PRINT TAB(35,1) " "
3750 PRINT TAB(0,3)CHR$ (&91)
3760 FOR A=35TO 7 STEP -1
:PRINT TAB(A,3) " x(wt "
:FOR AA=1TO 100
:IF ADVAL (-6)=15 PROCTUNE
3770 NEXT
:NEXT
3780 PRINT TAB(7,3) " "
3790 REM SPACE INVADERS - APRIL 1983
3800 PRINT TAB(7,4)CHR$ (&91)"x(wt";
CHR$ (&81) " = MYSTERY POINTS"
:FOR AA=1TO 1000
:NEXT
3810 PRINT TAB(8,6)CHR$ (&92)"zu";
CHR$ (&84) " = 100 POINTS"
:FOR AA=1TO 1000
:NEXT
3820 IF ADVAL (-6)=15 PROCTUNE
3830 PRINT TAB(8,8)CHR$ (&93)"e";
CHR$ (&83) " = 80 POINTS"
:FOR AA=1TO 1000
:NEXT
3840 PRINT TAB(8,10)CHR$ (&94)"~";
CHR$ (&82) " = 60 POINTS"
:FOR AA=1TO 1000
:NEXT
3850 PRINT TAB(8,12)CHR$ (&95)">m";
CHR$ (&81) " = 40 POINTS"
:FOR AA=1TO 1000
:NEXT
3860 PRINT TAB(8,14)CHR$ (&96)"g";
CHR$ (&85) " = 20 POINTS"
3870 IF ADVAL (-6)=15 PROCTUNE
3880 PRINT TAB(8,16)"DO YOU HAVE JOYST
ICKS? "
:IF GET <> 89 GOTO 3900
3890 KZ=1
:PRINT TAB(8,16)"USE JOYSTICK
TO MOVE TAB(8,18)"PRESS
BUTTON TO FIRE LASER"
:PRINT TAB(8,20)"PRESS BUTTON
TO START"
:GOTO 3930
3900 KZ=0
:PRINT TAB(8,16)"Z KEY = LEFT
TAB(8,18)"X KEY
= RIGHT"TAB(8,20)"COPY KEY TO
FIRE LASER"
3910 PRINT TAB(8,22)"ANY KEY TO START"
3920 IF GET <>0 GOTO 3940
3930 X=ADVAL (0) AND 3
:IF X>0 GOTO 3940
ELSE GOTO 3930
3940 *FX 11,1
3950 ENDPROC
3960 DEF PROCFAME
3970 *FX15,1
3980 CLS
:J=0
3990 IF SCOREZ<HSCOREZ(10) GOTO 4100
4000 IF SCOREZ>HSCOREZ(1) HS(1)=136

```


Alien Invasion listing

From Page 133

```

:J=1
:FOR JZ=9TO 2 STEP -1
:HSCOREZ(JZ+1)=HSCOREZ(JZ)
:NAME$(JZ+1)=NAME$(JZ)
:NEXT
:HSCOREZ(2)=HSCOREZ(1)
:NAME$(2)=NAME$(1)
:HSCOREZ(1)=SCOREZ
:GOTO 4050
4010 FOR JZ=10 TO 1 STEP -1
4020 IF SCOREZ(HSCOREZ(JZ)) HS(JZ+1)=13
6
:J=JZ+1
:JZ=1
4030 NEXT
4040 FOR JZ=10TO J+1 STEP -1
:HSCOREZ(JZ)=HSCOREZ(JZ-1)
:NAME$(JZ)=NAME$(JZ-1)
:NEXT
:HSCOREZ(J)=SCOREZ
4050 FOR JZ=10 TO 11
4060 PRINT TAB(0,JZ)CHR$(141)
CHR$(133)"CONGRATULATIONS, YOUR

```

```

SCORE IS RANKED "TAB(14,JZ+3)
CHR$(141)CHR$(133)"NUMBER ";J
4070 NEXT
4080 *FX12,0
4090 INPUT TAB(8,18)"ENTER YOUR NAME
",NAME$(J)
:YZ=HSCOREZ(1)
4100 CLS
:FOR JZ=0 TO 1
4110 PRINT TAB(8,JZ)CHR$(133)
CHR$(141)"BEEB HIGH COMMAND"
4120 NEXT
4130 FOR JZ=1 TO 10
4140 PRINT TAB(0,JZ*2+1)CHR$(HS(JZ))J
Z;" ";HSCOREZ(JZ);" "LEFT$(NAM
E$(JZ),15)
4150 NEXT
4160 PRINT TAB(4,23)" SPACE BAR
FOR ANOTHER GAME"
:IF GET <> 32 GOTO 4160
ELSE GOTO 4170
4170 *FX11,1
4180 GOTO 110
4190 ENDPROC
4200 REM **** ARCADE JINGLE ***

```

```

4210 DEF PROCTUNA
4220 FOR I=1TO 13
:READ A(1)
:NEXT
4230 DATA 4,20,32,52,68,80,100,116
,128,148,164,176,196
4240 ENDPROC
4250 DEF PROCTUNE
4260 FOR I=1TO 4
4270 SOUND 1,4,A(RND(13)),8
4280 NEXT
4290 SOUND 2,4,A(RND(13)),4
4300 SOUND 2,4,A(RND(13)),4
4310 SOUND 3,4,A(RND(13)),2
4320 SOUND 3,4,A(RND(13)),2
4330 ENDPROC
4340 *FX12,0
4350 ON ERROR OFF
4360 END

```

This listing is included in this month's cassette tape offer. See order form on Page 137.



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This compact, elegant unit combines the following attractive features:

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SPELLWISE comprises a set of one disc (or two tapes) plus a complete user manual. The tape version is limited to cassette recorders with motor control. SPELLWISE costs £12 on tape, £18 on disc and can be obtained from:—

DATAWARE FREEPOST SWINDON SN3 4BR

From Page 78

```
410 START%=START$(NUMBER)
:MIS%=MIS$(NUMBER)
:FIN%=FIN$(NUMBER)
420 ENDPROC
430 DEF PROCINPUTCHECK
440 ANS%=""
:CLS
:TRYS=1
:CORRECT=FALSE
:PROCHEADING
```

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July issue of The Micro User.

```
450 PRINT
:PRINT TAB(0,9)CHR$(RND(7)+128)
"THIS IS QUESTION NUMBER "
STR$(QUESNO)
460 PRINT
:PRINT CHR$(RND(7)+128)"THERE
WILL BE A TOTAL OF "STR$(MAX)
" QUESTIONS"
470 PRINT
:PRINT CHR$(RND(7)+128)"ABOUT
"TITLE$
480 REPEAT
490 ANS%=""
:FX21,0
500 PRINT TAB(0,20)CHR$(RND(6)+129)S
TART%;CHR$(136)STRING$(LEN(MIS$
),")CHR$(137)FIN$
510 REPEAT
520 PART%=GET$
:ANS%=ANS%+PART$
530 PRINT TAB(LEN(START$)+LEN(ANS$)
+1,20)PART$
540 UNTIL LEN(ANS%)=LEN(MIS%)

550 IF ANS%=MIS$
THEN CORRECT=TRUE
:PROCWRITE(CONGRAT$(RND(3)))
ELSE PROCERROR
560 IF CORRECT AND TRYS=1
THEN RIGHT=RIGHT+1
570 UNTIL CORRECT OR TRYS>3
580 ENDPROC
590 DEF PROCERROR
600 PROCWRITE(ERRMSG$(TRYS,RND(3)))
610 TRYS=TRYS+1
620 IF TRYS>3
THEN MESSAGE$="THE CORRECT ANSWER
IS "+MIS$
:PROCWRITE(MESSAGE$)
630 ENDPROC
```

```
640 DEF PROCWRITE(MESSAGE$)
650 PRINT TAB(0,18)CHR$(RND(7)+128)M
ESSAGE$
660 FOR I%=1TO 8000
:NEXT
670 PRINT TAB(0,18)STRING$(40," ")
680 ENDPROC
690 DEF PROCHEADING
700 CLS
710 VDU 131,157
:PRINT
:VDU 131,157,129,141;
:PRINT TAB(10)"MISSING WORDS"
:VDU 131,157,129,141;
:PRINT TAB(10)"MISSING WORDS"
:VDU 131,157;
:PRINT
720 PRINT
:VDU 135,157,133,136;
:PRINT TAB(7)"BY PETER DAVIDSON"
730 ENDPROC
740 DEF PROCTITLE
750 PRINT
:VDU 131,157,130;
:PRINT TAB((34-LEN(TITLE$))/2)TI
TLE$
760 ENDPROC
770 REM **THE FOLLOWING DATA IS
THE NUMBER OF SENTENCES IN
THE DATA
780 DATA 22
790 REM **THE FOLLOWING DATA IS
THE TITLE
800 DATA NURSERY RHYMES
810 REM **THE FOLLOWING DATA IS
3 ERROR MESSAGES PRINTED AT
RANDOM AFTER FIRST ERROR
820 DATA THAT NOT RIGHT...TRY AGAIN
830 DATA YOU MADE A MISTAKE-HAVE
ANOTHER GO
840 DATA WRONG! HAVE ANOTHER GO
850 REM **THE FOLLOWING DATA IS
3 ERROR MESSAGES PRINTED AT
RANDOM AFTER SECOND ERROR
860 DATA WRONG AGAIN! HAVE ANOTHER
GO
870 DATA STILL NOT RIGHT...BUT HAVE
ANOTHER GO
880 DATA ANOTHER MISTAKE - HAVE
ONE MORE TRY
890 REM **THE FOLLOWING DATA IS
3 ERROR MESSAGES PRINTED AT
RANDOM AFTER THIRD ERROR
900 DATA WRONG AGAIN....LET'S MOVE
ON
910 DATA YOU OBVIOUSLY DON'T KNOW
THIS ONE
920 DATA THIS IS THE THIRD TIME
BUT STILL WRONG
930 REM **THE FOLLOWING DATA IS
```

```
3 CONGRATULATION MESSAGES PRINTED
AT RANDOM IF ANSWER IS CORRECT
940 DATA WELL DONE....YOU'RE RIGHT!
950 DATA CORRECT....YOU'RE VERY
CLEVER
960 DATA CONGRATULATIONS! YOU GOT
IT RIGHT
970 REM **THE FOLLOWING DATA IS
THE SENTENCES THAT WILL BE
USED
980 REM **REMEMBER TO CHANGE LINE
780 IF YOU ADD MORE
990 REM **PUT COMMAS AROUND THE
WORD THAT YOU WANT MISSED OUT
1000 DATA "BAA, BAA, BLACK",SHEEP
,HAVE YOU ANY WOOL
1010 DATA "DING, DONG","BELL,PUSSY'S
IN THE WELL
1020 DATA "GEORGIE PORGIE","PUDDING
,AND PIE
1030 DATA HUMPTY DUMPTY,SAT,ON A
WALL
1040 DATA THE MOUSE RAN,UP,THE CLOCK
1050 DATA I HAD A LITTLE,NUT,TREE
1060 DATA JACK AND,JILL,WENT UP THE
HILL
1070 DATA JACK SPRAT COULD,EAT,NO
FAT
1080 DATA THE,KING,WAS IN HIS COUNTING
HOUSE
1090 DATA "LITTLE BOY BLUE, COME"
,BLOW, YOUR HORN
1100 DATA MARY HAD A,LITTLE,LAMB
1110 DATA OLD MOTHER HUBBARD WENT
TO THE,CUPBOARD,""
1120 DATA "PUSSY CAT,PUSSYCAT","WHERE
,HAVE YOU BEEN
1130 DATA THE QUEEN OF,HEARTS,SHE
MADE SOME TARTS
1140 DATA RIDE A COCK,HORSE,TO BANBURY
CROSS
1150 DATA ROCK A BYE,BABY,ON THE
TREE TOP
1160 DATA "RUB A DUB DUB","THREE
,MEN IN A TUB
1170 DATA SING A SONG OF,SIXPENCE
,""
1180 DATA THERE WAS AN OLD,WOMAN
,WHO LIVED IN A SHOE
1190 DATA "TWINKLE","TWINKLE,LITTLE
STAR
1200 DATA "TOM, TOM, THE PIPERS"
,SON,""
1210 DATA WEE WILLIE WINKIE,RUNS
,THROUGH THE TOWN
1220 DATA YANKEE DOODLE,CAME,TO TOWN
```

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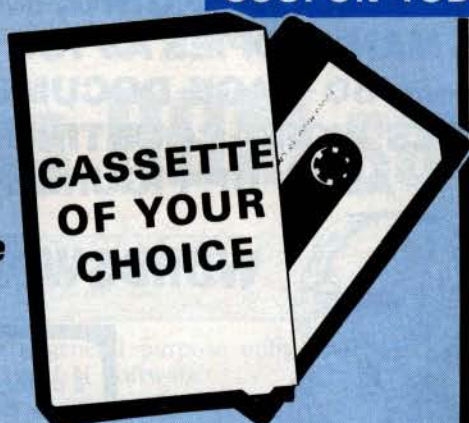
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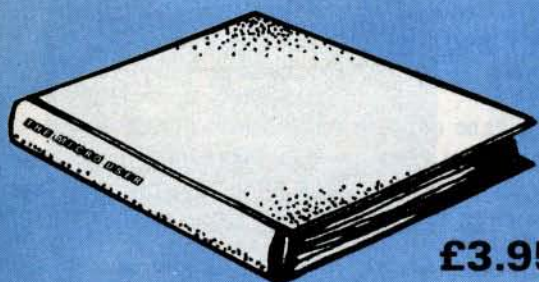
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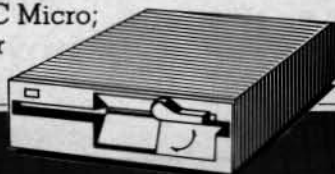
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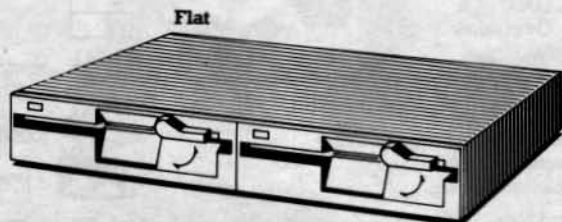
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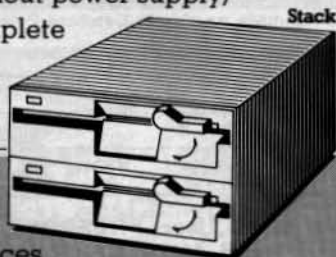
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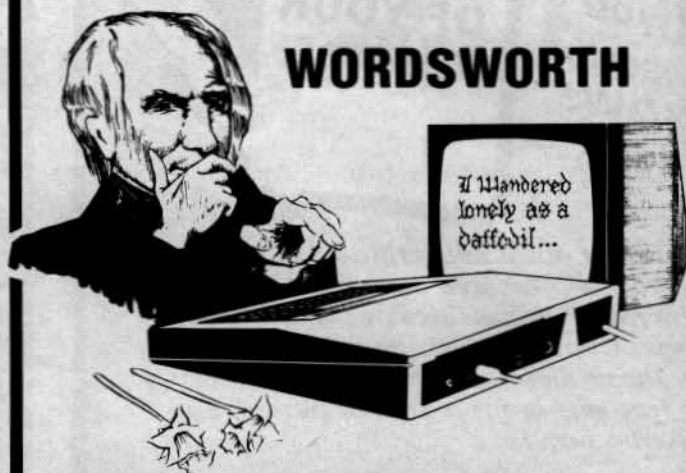
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This ROM saves programming time and effort

UROM 1.2

J and H Software

UROM is a general purpose utilities ROM by J and H Software.

The most noticeable feature is that there are no problems here with learning awkward syntax.

After typing in *UTILS the menu page is displayed, allowing you to select the required function.

In each of the routines there is a line at the bottom of the screen which gives the required responses.

The utilities provided are:

Memory dump

This displays the values of memory locations (in hex) along with their Ascii equivalents, in screenfuls of 16 rows of 8 bytes at a time.

Simple editing is possible by giving the address and the value that is to be placed there. Whilst screen dumps are formatted for display in Mode 7, the printouts are designed for use with an 80 column printer.

Disassembler

A simple disassembler giving the address in hex, the code in hex, mnemonics (including with immediate addressing hex, decimal and Ascii equivalents).

Block move

For changing the location of a block of memory.

Find and replace

Variable names and procedure names can be searched for and altered, but this will not work for Basic tokens.

Display user keys

A useful utility if you've programmed the function keys and want to know exactly what you typed in. It's a pity that it doesn't allow cursor editing of the

keys.

Set up user keys

This programs the user keys with a range of useful commands. Helpful, but they won't be everyone's first choice. More suited to the cassette user than the disc user.

Edit envelope

If you have problems with all the parameters of the ENVELOPE statement, you'll find this editor very useful.

Envelope

Shows the Basic statement corresponding to any current envelopes.

Define character

Although VDU23 is not as complicated as ENVELOPE, many will find the need for a character editor. A single 8 x 8 grid is displayed in Mode 7. Not so good for defining shapes which are composed of a number of different

characters.

Cure 'bad program'

Probably the single most useful facility to Basic programmers. There can't be many people who haven't come up against the Bad program message. If it can be recovered, this routine will.

6502 Monitor

A simple monitor which allows single step, skip instruction or continuous execution of machine code.

String search

Each time a searched for string is found it will print out the address of the start of the string.

UROM was one of the earlier utility ROMs to find its way onto the market. Although most of the functions performed are simple, they do save programming time and effort.

Jim Notman

A package to aid disc operation

Disc Doctor, version 1.05

Computer Concepts

THIS new piece of eprom-based software is from Computer Concepts, a firm already well known for their word processing package Wordwise.

My first problem was that the disc commands of Disc Doctor would not work with any of the numerous versions of the Amcom DFS (up to serial no. 7370) I have access to, nor the Watford DFS 1.00.

The newer 1.2 version of the Watford DFS does allow it to work correctly, but it shares some command names with Disc Doctor.

As the right hand ROM takes precedence, you'll need to decide which chip's commands you want, then make sure it is in a ROM socket towards the right of the other.

One lesson from this is that if you have any non-Acorn DFS, tell the dealer which ROMs are in your Beeb

and get some assurances from him before you buy!

If Disc Doctor is plugged into one of the sockets to the right of the DFS, then at switch-on or BREAK a Disc Doctor message is printed on the screen along with the DFS title. However if it is inserted into a socket to the left of the DFS, only the Basic and DFS startup messages appear.

Twenty new commands are available (see Page 140). Only 13 of these are directly applicable to the disc system, the other seven being general utilities.

Two of the commands, *FORM and *VERIFY, mean that you no longer need to use the utilities disc.

One of the most important disc utilities is a sector editor, which gives the facility to look at the value of every byte of a sector on a disc and change it if necessary. This is the *DZAP command.

The information is clearly displayed in teletext mode. Many other sector

UTILITIES 1.2

- A. Basic
- B. Memory dump
- C. Disassembler
- D. Block move
- E. Find and replace
- F. Display user keys
- G. Set up keys
- H. Edit envelope
- I. Envelope
- J. Define character
- K. Cure 'bad program'
- L. 6502 monitor
- M. String search

From Page 139

editors are in an 80 column mode, like mode 0, making it difficult, if not impossible – to read on a TV, especially a colour TV.

The display consists of eight columns of hexadecimal values with their Ascii equivalents.

Scrolling through the sector is controlled using the cursor keys, as in Wordwise.

The active location is shown by two arrows. An interesting feature I liked is that input to this active location can be entered in Ascii, decimal, hexadecimal or even binary.

Movement between tracks and sectors was easily accomplished using the CTRL and the left and right cursor keys. If any part of the sector is altered, trying to leave the sector will produce a SAVE (Y/N)? request.

My main dislike was the error handling. If Disc Doctor encountered a disc error on entry to a routine, it would simply report the error.

At other times an error message "ERROR:L" or "ERROR:S" appeared near the top of the screen with no other indication of what this meant, as there was no error number, nor any explanation in the documentation of these load or save errors.

In some error conditions the Beeb would "hang-up", control only being regained by pressing the BREAK key.

The most interesting command was *SEARCH.

With this command you can search for a specified string on the disc. The routine enters the *DZAP editor and the screen flashes through sectors until the string is found. The search can be continued simply by pressing the COPY key.

*RECOVER will load specified sectors into memory while *RESTORE can place a section of memory onto specified sectors.

*DOWNLOAD is used to load and relocate a program. This is most useful where software written for the cassette system (located at &E00) has to be transferred to a disc system (PAGE=&1900).

*DISCTAPE and *TAPEDISC are used as their names suggest for transferring files between the systems. The commands allow a number of files to be transferred in succession. This makes it easy to backup a disc to tape.

*JOIN will add a number of files together in one new file. Since very large files can now be created there is a *PARTLOAD command which can load a section of a file.

*MENU or Break+M saves you having to write a menu program. A simple screen is displayed with the disc title at the top and all the files from

DISC DOCTOR 1.05

```
DIS (<sta>) (<end>) (<ofs>)
DISCTAPE <afsp> (<afsp>)...
DOWNLOAD <fsp> (<adr>)
DSEARCH <str> <trk> (<trk><sct><drv>)
DZAP (<trk>) (<trk><sct><drv>)
EDIT (<key no.>)
FIND <str>
FORM <drv> <no. trks> (<stt>) (<S>)
JOIN <fsp> <afsp> (<afsp>)...
MENU (<drv>)
MOVE (<dest page>) (<src page>)
MSEARCH <str> (<adr>)
MZAP (<adr>)
PARTLOAD <fsp> <ofs> <ext> <adr>
RECOVER <trk> <sct> <sct> <adr> <drv>
RESTORE <trk> <sct> <sct> <adr> <drv>
SHIFT <src> <dest> <ext>
SWAP (<drv>)
TAPEDISC (<fsp>)...
VERIFY (<drv>) (<no. trks>) (<stt>)
```

The Disc Doctor commands

directories + and – preceded by a letter.

By simply pressing this letter, the program is loaded and run. (The + and – directories are used to denote Basic and machine code programs).

*SWAP is Computer Concepts' answer to the problem of only having a maximum of 31 files with the Acorn DFS. Their system allows a maximum of 60 files. The disc is effectively divided into two with the file information for the other half stored in a file called !!!!!!! Each half even has its own title. *SWAP moves between the two.

The problem with this method is that with a 40 track system 30 files only have 50k of storage space, so this system is only useful for discs of short files.

The other commands which make up this package are general utilities.

*DIS is a reasonable general purpose disassembler. The information displayed includes the address (in hex), mnemonics, code (in hex) and Ascii equivalent.

It would have been clearer if the operating system calls had been given as their official title rather than an address: OSWORD is far more easily recognised than &FFF1.

Disassembly takes place a line at a time after depressing a key. It also allows branches to be followed and printouts to be made.

*EDIT displays function key definitions so that they may be edited.

*FIND gives the line numbers of a string in a Basic program. Finding keywords is a little more awkward as it needs you to give a token value rather than typing in the keyword.

*MOVE changes the position of a

Basic program in memory so that it will start at a different page.

*SHIFT can move a block of memory from one location to another.

*MSEARCH looks for a specified string in memory.

*MZAP is very like *DZAP but is used as a memory editor. The screen is updated many times a second, so that looking through parts of memory where byte values are constantly changing, like page &2, you'll see a most interesting display.

Most of the commands were reasonably easy to use. Some numbers used in the commands default to decimal values, some to hexadecimal, which can be a little confusing at first.

However there is the ability to enter numbers in decimal, hex or any other base between 2 and 99!

The 39 page spiral-bound manual supplied with the software was clearly written and informative. One annoying omission from the documentation was that there was no indication of the memory (RAM) used by this package.

For instance zero page locations &70 to &8F are used so that using *MZAP to alter them can cause unpredictable effects.

I was surprised to see there was no BACKUP-like command which would cope with disc errors, as it is always simpler (and safer) to experiment with recovering information from a backup copy, rather than from the original.

To sum up, Disc Doctor should prove a most useful all-round utility for DFS users, although better error handling routines would make it an even more attractive package.

Jim Notman

Hoist your aerial aloft and get tips from the Oracle

Teletext Adapter

Acorn

TELETEXT is an information service that is offered both by the BBC and the IBA. They often use examples of it instead of the test card – the BBC provides Ceefax, and the IBA Oracle.

The information is transmitted in numbered pages which can be displayed one at a time on a suitable TV.

The signals for this service are digital and as such are obviously perfect for use with a computer.

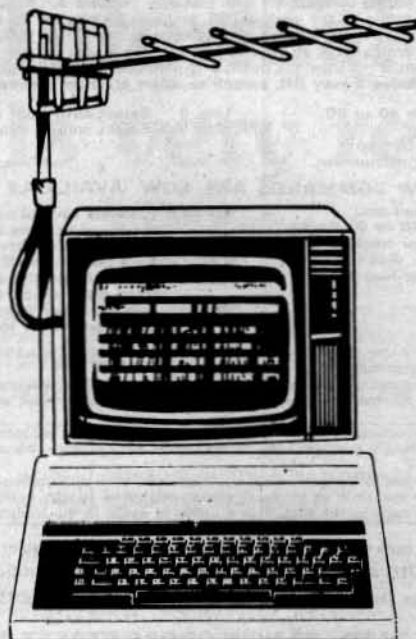
The Teletext adapter, like most other add-ons for the BBC Micro was subject to delays.

Now that it's available and I've used one, I must admit that for someone who hasn't had access to any of the Teletext facilities before, it's addictive.

The adapter itself is in a box about half the width of the computer and is shaped to form a single unit with the micro.

At the rear are four small tuning knobs, an aerial socket and an on/off switch. The unit is powered from the mains and is connected to the computer via the 1 MHz bus.

The software that forms the TFS (Telesoft Filing System) comes in



eprom. Once inserted as default filing system the machine starts up with the message 'Acorn TFS'.

With TFS and DFS the OSHWM is &2A00, so the first thing to do was to find out how I could still use the computer when not using the TFS.

This is simply achieved by turning off the power to the Teletext unit and performing a hard BREAK. The message 'Acorn TFS no power' comes up and OSHWM is &1900 once again. Nice and easy, that!

Next step was getting down to use the

TFS. The first problem was that I didn't have an aerial. I live very close to a repeater and I normally just use a loop aerial on my TV.

One of the appendices in the manual gives two pages of information about Teletext reception and was very useful.

I ignored all this and fitted a simple internal UHF aerial and luckily everything was OK.

It would seem that to receive Teletext properly relies on a very "clean" TV signal so if you live in a fringe area for TV reception you could have difficulties.

A point to mention here is that you do need the relevant class of licence to receive Teletext even on a monitor, so if you don't own a TV or you've got a monochrome licence and a colour monitor it's going to cost you!

The TFS will operate in two main modes, the Terminal mode and the Telesoft mode.

In Terminal mode you have virtually all the facilities of an intelligent Teletext receiver at your disposal.

There is a tuning facility, pages can be linked, and pages can be stored to any other filing system available to the user.

An added extra is that you can also look at and load the computer programs that the BBC Telesoftware Service broadcast.

Telesoft mode is specifically for dealing with Telesoftware, although it does have commands in common with Terminal mode. Telesoft should be thought of as a read-only filing system.

The manual that comes with the adapter is excellent. It includes all the information that is necessary to use the system at any level, from assembler level to naive user.

There are also 23 pages of technical information for anyone interested in the complexities of Teletext. They make very interesting reading for someone who doesn't know anything about it.

All in all I enjoyed using this add-on. The only problems I can see are those of reception, but a well installed aerial should cure these.

At £225 it's a bit expensive for the home user, especially as there doesn't seem to be much Telesoftware available, although I suppose the service is in its infancy.

Alan Plume

THIS LIGHT PEN ISN'T MEANT FOR DOODLING

Colour Lightpen

RH Electronics

THIS is the best light pen for the BBC Micro that I've seen so far. It is very well made and comes with a comprehensive 13 page manual.

The pen is metal with a red LED indicator to the rear. It is linked to an interface box via a screened cable which is in turn plugged into the analogue socket of the computer.

The cassette supplied contains a machine code driver, procedures to set the light pen up for your particular TV or monitor, and three demonstration

programs.

One of these demonstrates how the pen hardware can operate in user-defined modes selected by software.

The only reservation I have about light pens using the 6845 CRTC is that only character resolution (in Mode 1) is possible.

This means that a light pen of this type is not really a drawing aid, but merely a way of interacting with a program without the keyboard.

To their credit, RH Electronics do point this out on page 1 of the manual, something that other light pen manufacturers do not do.

Alan Plume

THE *REAL* AMCOM DISC FILING SYSTEM

One of its distinct advantages against the Acorn DFS is the speed in which it handles Random Access Files (refer Benchmark figures), consequently, it can load wordwise files in approximately half the time taken by the Acorn DFS.

PRINT 1000 numbers	9.8	Move PTR 1000 places	2.9
PRINT 100 strings	56.2	Write test relative file	51.0
INPUT 1000 numbers	5.7	Read test relative file	24.2
INPUT 100 strings	22.7	Write relative file backwards	81.0
BPUT 1000 bytes	4.5	Read relative file backwards	36.0
BGET 1000 bytes	3.4		

This independent disc filing system adds greater flexibility to your BBC Computer. It has two distinct modes which auto select on booting the system. Mode zero is the standard mode which retains compatibility with presently available software. Mode one, the extended mode, allows for sixty-three file names per disc, over 100% increase on the existing DFS, and also permits the file names to be up to fifteen characters in length, providing much greater scope for meaningful file names. In both modes page is set at &1500. This gives 10% more usable memory than Acorn's DFS, in modes 0, 1 and 2. If you already have a Disc interface fitted, it is very easy to upgrade, you simply remove the DFS Eprom and replace it with the Amcom DFS Eprom, if not then it is possible to purchase an entire Disc interface kit (consists of 11 I.C.'s) with this DFS track cutting is not required. **Also includes 8 way DIL switch to allow start up options to be set. (see below).**

Link 1 Determines if the system starts up in 40 or 80 tracks
Link 2 Select Acorn or Extended mode at start-up
Link 3 & 4 Selects type of drive ie. Shugart, Canon etc.

Link 5 Select auto-boot or not, on 'break'
Link 6-8 Select screen mode on start-up, ie. model 0 to 7 etc.

NINE NEW COMMANDS ARE NOW AVAILABLE

*Clear Quickly and easily erases a entire disc
*Format Formats drive 0 to 3 in either 40 or 80 tracks
*OPT2,n Alters the number of sectors per track to n
*OPT3,n Alters the number of tracks per disc to n
*OPT5,n Sets the start of the DFS buffer (see OPT7)

*OPT6,n Provides control over which part of the file spec. will be displayed ie. only display directory and program length, or just display drive and load address.

*OPT7,n Sets the length of the DFS buffer
*OPT8,n Double steps the disc drive to allow the reading of 40 track discs on 80 track drives

*SYS Selects either Acorn mode or Extended mode
Commands now include *Access

There is a built-in formatter which will format in either forty or eighty tracks in both modes of operation. This formatter also allows for user definable parameters to be included for the development of software protection. With this disc filing system a user definable buffer can be used while compacting the disc. This will enable disc compacting to be carried out without overwriting any programme in memory. Alternatively a new disc may be formatted without any resident programme being overwritten.

This DFS also allows for the use of wildcard characters, using either the $\#$ symbol for a single wildcard and the * character for multiple wild characters. (e.g. CHAIN "P*" could be used to chain a program called PRINTER as long as there are no other files whose names begin with P).

This DFS is totally compatible with Econet etc., and is complete with a utilities disc and comprehensive manual. The utilities disc contains many useful programmes including printer screen dumps in all modes, including High Res. (Epson & NEC 8023). It also has a nibble editor to scan discs, read data, edit them, and then write back to the disc. Plus a utility to assist in the transfer of cassette files to disc.

Available now direct from Pace or contact your local dealer.

Comes complete with disc, 8 way DIL switch, manual and full fitting instructions at £34 inclusive of VAT.

Also available as a complete Disc Interface Kit (including DFS) at £95 inclusive of VAT.

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**SUPERB
REVIEW!**

AID at last!

Assembler Interactive Debug for the
BBC Micro with DUALSCREEN

**STOP PRESS . . . AID receives
superb review . . . see below**

AID has now established itself as the finest machine code monitor ROM for the BEEB. With its unique DUALSCREEN operation so far in advance of the competition, AID puts unprecedented debugging power into your hands. No other monitor can begin to tackle machine code graphics – something AID takes effortlessly in its stride! Beginner or expert, you cannot afford to be without DUALSCREEN AID.



Read what "The Micro User" thinks . . .

“My immediate impression of AID was that it was a very professional product . . . AID offers additional features far in advance of other monitors . . . I found it easy to use, particularly as the user guide is very thorough and accurate . . . I wish I had something like this when I first started dabbling in machine code . . . The last facet I explored was the DUALSCREEN facility, which is perhaps the pearl of the system . . . In conclusion, AID seems a must for the serious machine code programmer and a very useful learning aid for the novice. It is a highly professional product in every way and could prove to be the standard by which others are compared.”

"The Micro User" January 1984

The most advanced machine code AID for the BBC Micro

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ROM
plus manual
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Informal approach is very rewarding

AFTER staying behind many hours after the children had gone home from school, I decided to buy a BBC Micro of my own (1.2 OS but minus a disc interface).

I have bought all the back issues of *The Micro User* and spent hours reading and typing programs, probably learning more from my mistakes and working with a friend rather than wading through the *User Guide* or some of your more learned articles. (I was never much of a reader.)

I have particularly enjoyed loading or typing in programs and then altering them, such as by replacing entries requiring use of Return by using GETS.

In a French vocabulary test, I added music at the beginning and end with a procedure, and programmed keys to add lines to skip past the music should the user choose the option of a silent quiz.

For the "counting" program (*Electron User*, November issue) I added a procedure including some of the sounds from "Sounds Exciting" to make the computer give a cheeky (though inoffensive I add) response should the user choose not to play once the program is loaded and running, and a line to ask if the user will press the space-bar to restart after having a go.

I found Tim Hartnell's "Personal Computer Handbook" helpful in getting into computing, providing simple listings

which could easily be manipulated.

As a dabbler I have enjoyed this informal approach. I hope you will continue in your excellent magazine to cater for

chemists or stationers – if they would rectify these difficulties on two separate occasions, when they were fitting the 1.2 operating system and latterly the speech synthesiser, and

like a traditional micro!

Don't forget that it has independent input and output serial buffers, and interrupts to prompt action when the buffers need attention. These would allow machines to be linked in a cheap asynchronous loop.

With only three wires between stations, carrying signal, ground and busy, you can use inexpensive audio connectors for the join.

A stereo jack-plug at one side for receive and a socket at the other for send meet the RS 423 DIN in the middle. Stretching and closing the loop simply needs through-wired stereo extenders.

With the OUT of one BBC connected to the IN of the next, the data would have to be sent in addressed, buffer-sized packets to prevent a lock-up.

The addressing could be quite simple. If each block is preceded by two (three) bytes, then you could specify one, many or all of 16 (24) machines without complex decoding.

Just AND the address with your own, which has a single bit set. If not yours, then send the message on.

If yours, then clear that bit and send the message on. If both bytes of address come in as zero, then it has been all the way around and you can dump it after checking its survival.

To do this properly, of course, the I/O would need interrupt programming, but a cheap eeprom should have ample capacity by using the facilities in the BBC's OS.

The important step is to standardise the network. I'd like to be able to type

IF you're a Prestel subscriber you can now write to Micromail by Electronic Mail. Our Mailbox number is 614568383.

the likes of me as well as those who fully understand the subject. – Michael Bowie, Norbury, SW16.

Pixel problem

CAN you help me solve a couple of problems which I have had with my BBC Micro since I bought it last year?

There are three small areas of the screen, approximately a pixel size each, which will not conform to the colours set up on adjacent locations.

And there is an occasional hiss on the speaker, similar to that obtained on a radio during a storm, which also seems to affect the picture.

I asked my local dedicated computer shop – not a

while I was advised that all was well when the machines were collected the problems persist. – David Rickwood, Tonbridge, Kent.

● Your machine is faulty. We had a similar one. The cause is probably either a RAM fault, 6845 fault or ULA fault.

Anyway – it's easily fixed. Take it back!

Cheaper links

I WAS very interested by your article on linking BBC Micros (*Micro User*, October). One to one (line) or one to several (star) networks are handy, but the software and hardware rapidly become too complicated using your scheme.

You're still using the BBC

for a business computer.

I've been in shops and seen the salesmen singing the Beeb's praises but once the price is mentioned the customer's usual response is "No thank you".

Features it may have, but an extremely over-priced value it also possesses in Australia. Maybe with a bit of luck, something might happen and the prices will drop.

Darren Fishman,
Victoria, Australia.

The Australian angle

FIRSTLY, I'd like to congratulate you on a great magazine, even if it is a bit slow in getting all the way out here. (It's mid-October and the August issue is not out yet!)

The *Micro User* has taken into account all levels of Beeb users and tailored the magazine accordingly. Good stuff!

Meanwhile, the BBC Micro remains at a ridiculously high price out here in Australia.

Converting to your pounds

sterling, here the BBC costs around £1,000, while a disc drive is around £600.

Comparing to Britain, the Beeb works out at least twice as expensive as in your country.

Instead of the BBC Micro competing against the likes of the Spectrum, Atari, Commodore 64 etc, as in England, its price pushes it up into the Apple IIe market.

So in Australia you'd be shelling out the same money as

From Page 143

something like *LINK 11 to set up the system and state my address, then transmit data as if through *TAPE.

Both origin and target address(es) are put in the file name, and the intervening machines automatically (and invisibly) pass the blocks from receive to send buffers. The target(s) must amend the address, then copy the data to both the send and input buffers.

The simplest way to get the information into a program would be to check the *LINK status as part of the command loop, then INPUT any data in the queue. — Nik Kelly, Liverpool.

Fair enough!

AS a regular (and avid) reader of your magazine I looked forward to the London Fair with great anticipation.

Being a confirmed southerner who believes that all life stops at Watford (now extended to Cambridge) I was wondering what the inhabitants of wild and distant Stockport could put on for us in the big city.

Suffice it to say, I have now included it on my map of 'civilised spots outside London'!

When is the next Fair in London? — R. Southall, Surbiton, Surrey.

● You'll be pleased to know we're moving south again next month for the Electron & BBC Micro User Show. It opens on March 29. Read all about it on Pages 104-105.

Power packed

MY BBC Micro is an early Model A (Issue 3 board) which I have fully upgraded to a Model B in all respects except the

power supply.

I have also fitted the disc interface, my drive being driven from its own integral power supply.

Given that I still have the original Model A supply unit, how many sideways ROMs will it safely power? At present, apart from the OS 1.2, the DFS and the Basic chips, I have plugged in a word processing chip. And what about the speech chips? — M.T. Michaelides, The Netherlands.

● I don't know the answer. Put it this way — the one I've got at work powers all four. Mike Cook.

Dipping into disc storage

REGARDING your response to a letter from Simon Taurins in the October issue of *The Micro User*, there are inexpensive ways of using the disc storage facilities of the RML 380Z from a BBC Micro.

Firstly, there is a one BBC-RML link originating from David Benzie of the ITMA project at the College of St Mark and St John, Plymouth.

Secondly MACE, the West Midlands MEP Regional Centre, have devised a network system that uses the RML to

serve BBCs. Their address is: Four Dwellings School, Dwellings Lane, Quinton, Birmingham B32 1RT.

Further information on either should be available from any MEP Regional Centre. — Neil Stanley, MEP Regional Information Centre, Merseyside.

Suppressed display

I NOTE in the December issue of *The Micro User* a method to suppress display while using the printer. If one uses *FX 3,10 this disables the VDU driver and enables the printer without recourse to VDU 2 or CTRL B.

This instruction directs output to the printer only. *FX 3,0 redirects all output back to the TV.

I have not investigated the possibility that the *FX 3,10 (combining *FX 3,8 & *FX 3,2) may prevent control characters being sent to the printer. However if one is only interested in sending text then the above calls give the easier method. — Michael Swatton, Basildon, Essex.

● Thank you for your suggestions. Unfortunately, *FX 3,10 does seem to prevent sending control codes.

Long distance gamesmanship

HAVING recently graduated to the BBC Micro I wish to contact other users via my computer and play games with distant opponents.

I would also be interested in downloading software and accessing data banks like teletext.

Could you please give details on whether a telephone line and modem is needed and the facilities offered.

The ones I have been considering are Econet, a teletext adaptor and Micronet.

Also if I have not taken up too

much room already I would like to know what the different LOAD/SAVE baud rates do apart from speeding up or slowing down program transfer. Does this mean it can communicate with other types of computer? — Martin Dimoglou, Colchester, Essex.

● Econet would not suit your purposes. Both Micronet and the BBC Teletext service allow you to download programs and access databases — Prestel and Ceefax respectively.

Micronet needs a modem plus telephone line. Teletext just

Speedy loader

THE article by Paul Beverley (October 1983 issue of *Micro User*) seemed to answer a problem experienced when running teacher training courses — how to load programs quickly with only one disc unit.

Initial trials were unsuccessful, though instructions were followed precisely. A rival magazine also featured a similar idea, again incompletely.

Falling back on the *User Guide*, I was able to use Paul's simple wiring diagram and the following programmed keys to successfully splurt programs:

```
*KEY 9 *FX8,61M*FX3
,71ML,1*FX31M
*KEY 0 NEW1M*FX7,61M*FX
2,11M
```

Using these keys, a program loaded from disc on the transmitting (Tx) machine (do not run in case function keys are redefined) can be running on the receiving (Rx) machine within seconds by pressing F0 on Rx and pressing F9 on Tx. The program lines now scroll on Rx.

When the "syntax error" message appears press Break, then OLD Return, RUN Return on Rx.

The cable can then be

needs the Acorn adaptor and a good television aerial.

As for the interactive games, people are busy working on this — see our Link-up article in the October issue of *The Micro User*.

The different baud rates do effect the rate of loading and saving programs. However, for technical reasons, the slower rates are less susceptible to "noise" — that is, interference — and so they're often used for long distance data transmissions where it's important that the data survives.

transferred to a second Rx.

This method is almost as quick, and is subject to far fewer problems than the MACE system which uses a 380-Z as a server.

One immediate advantage of this arrangement is the preparation of cassette copies of disc programs on several different Rx computers. — Alan Shaw, Clitheroe, Lancs.

Basicode II network

I AM interested in making contact with people who use 300 baud modems together with the BBC Micro. In Holland we have a whole communication net between micros. Using Basicode II we can talk to many types of micros, including Apples, TRS 80s and Spectrums.

My address is: Hans Doeleman, Fuij 49, 1141CK, Monnickendam, Netherlands.

● Readers who would like to know more about Basicode II, the revolutionary computer language that enables micro to speak to micro, should see the article about it in the October issue of *The Micro User*.

Tape for her, too

I TAKE *The Micro User* and have been very pleased with what I have learned through its pages. I do however take issue with the wording of the advert for the Christmas tape. Why "in his stocking"?

For goodness sake why not say "in their stocking" and avoid compounding the prevalent idea that computing is for the male sex.

I'm not a particularly avid feminist but this really did irritate me as I'm doing my best to initiate my three daughters into the world of computers without giving them the idea

ROY Atherton's letter in the November issue of *The Micro User* deplored the use of GOTO and GOSUB. Might I politely suggest he does both, more especially the latter, now Winter is here.

The BBC Micro is a tool as is, say, a pen, and it matters not whether the latter is a quill, fountain pen or ball point, nor whether the script is block print, joined Form 3 script, copperplate gothic, pharmaceutical/medico script or advanced scribble — as long as it does the job.

This yuk about "structured" programming is for the birds!

I have thousands of my own very good full colour programs which all work fantastically well, and they are all full of GOTO; GOSUB; ON . . . GOTO/GOSUB as well as

PROCX and FNX with or without recursive techniques.

But perhaps Mr Atherton is unaware of the fact that there is a limit (on the BBC Model B) to the recursions — approximately 2,000 — then Bang!

One must use the techniques available and to hell with elegance, which is a highly subjective term anyway.

The modern toilet is absolutely functional and elegant, but it remains for all to see and recognise at once as merely a glazed ceramic avocado green or bluish pink privy and all the structuring in the world cannot alter that fact and all the structurings Mr Atherton refers to are ultimately fancy forms of GOTO and GOSUB. — J. Frank Hughes, Henllan, Denbigh.

I HAVE followed the great

GOTO controversy with some interest as I took my first faltering steps in programming in Fortran IV (I'm not really old, honest), where GOTO was a fairly sophisticated instruction.

It remains a valid instruction in Basic and has its uses. In particular, consider the structure "IF<condition>THEN<line number>". the execution of this is indistinguishable from "IF<condition>THEN GOTO<line number>".

The GOTO is implicit and thus is used by everyone, except only the most pompous of programming pedants.

It is time they admitted their feet of clay and got on with showing beginners how to programme clearly using all the instructions available to the best advantage of each. — Dr G.T. Freshwater, Lerwick, Shetland.

they're odd! — Janice Lee, Penarth, S. Glamorgan.

● Point taken — we normally catch these things before they go through. However, very few of the letters and articles we receive are from women and I doubt that the occasional use of an inappropriate pronoun is entirely responsible.

Disc Executor

WE would like to take the opportunity to reply to the misleading allegations made in your recent review of our tape to disc transfer program Disc Executor.

Disc Executor is compatible with Watford Electronic's DFS and will transfer all Acornsoft games to disc, including those which are locked.

According to our research

Acornsoft programs are the most popular. Disc Executor will also run those programs which have data files such as Acornsoft's Tree of Knowledge and Shirley Conran's Magic Garden.

It will transfer and run a large majority of the commercial software available at the present time including those from Program Power, Superior Software, A & F Software, Software Invasion, etc.

It will also allow full length adventures to be transferred to disc, something which can not be achieved using moving routines!

Disc Executor is designed to simplify the transfer of programs from tape to disc. It is intended for the person who has just upgraded to disc drives or simply doesn't have the time or expertise to write moving routines.

It does not move programs in memory but contains its own

DFS routines on disc which allow it to be completely independent of the disc workspace and allows programs such as Felix in the Factory to be loaded directly into memory.

Once the disc is full it is an easy operation to delete any of the programs. In this way Disc Executor can be used to transfer your favourite game of the month to disc and replace it with another whenever you become tired of it.

The response from the public to Disc Executor both at the BBC Micro User Show in London in December and from our mail order customers has convinced us that Disc Executor does what the user requires. — Stephen Green, Vision Software, Liverpool.

● There were no misleading allegations made in the review of Disc Executor and the product

MICROMAIL

sent in was accurately reviewed.

Let us state *Micro User's* position. If software houses wish to have their products reviewed in a satisfactory light, they should ensure that they send in a satisfactory version for review, rather than, as often happens, releasing a later, "enhanced" version.

We can only review products as they are, not as the vendor would like them to be.

In this case we are glad to say that the later version of *Disc Executor* does in fact support all the claims made in your letter, as do several enthusiastic users of your product who have contacted us since the review.

Hi-fi connection

I WOULD like to be able to connect my BBC Micro to my hi-fi and in doing so bypass the micro's internal amplifier. Is this possible?

I did read somewhere of two

terminals which may serve this purpose. Perhaps you would be able to advise regarding this matter. — A.G. McMahon, London.

● To judge by the number of queries we had on this at our London show, everyone wants to to this!

To obtain the signal you require for the external amplifier, simply take the feed from the link marked PL16 on the bottom left edge of the printed circuit board.

Hong Kong assembly

I HAVE obtained a copy of the August issue because I wanted the article on transfer from tape to disc. In the issue I found Colin Malone's letter about the origin of BBC Micros.

Please pass on to Mr Malone the fact that my BBC B was assembled in Hong Kong, that I bought it in Walton-on-Thames at the end of July and that I am expecting him to replace it with one built in the UK.

Which brings me on to the

BBC Micro and Weights and Measures and the sale of goods legislation.

Surely each new component, whether it is OS 1.2, Basic II or Main board 7, is the equivalent of admitting that the previously issued machines were in some way inadequate.

As such they should be replaced free of charge or the money returned. I can think of no other area where this would not apply.

How about some forthright comments and help on behalf of all BBC Micro purchasers? I believe you owe it to your loyal readers. — R.D. Jackson, Sevenoaks, Kent.

Time call

BECAUSE of children, etc, I am unable to take possession of "my" BBC Micro until after 9pm, and as a result I become carried away into the early hours of the morning. Trying to get up for work the following day is becoming a problem.

What I want to do is to program the Micro's internal clock to interrupt whatever I am

doing at, say, I am with the message:

"The time is now I am, Go to bed!"

I know it should be possible from what I picked up at the BBC Micro User Show in Manchester but I don't know how to do it.

Could you please tell me in absolute beginners language. I only have three weeks' experience. — Michael Pastore, Droylsden, Manchester.

● Your wish is our command. If you turn to Mike Cook's *Body Building* article on Page 116 you'll see a real time clock described.

Acacia Computers market a rather elegant desk diary that should more than fit the bill. We'll be carrying a full review soon.

Big bang

HELP! Anyone worked out an effective program for a nuclear explosion? — Alan Frost, Eastbourne.

● We are assured that the super-powers already have such a program well in hand.

And finally, with tongue firmly in cheek . . .

Slaving over a hot assembler

Dear Trev,

Don't be surprised if someday soon you read about me in your morning paper. The story will probably go along the lines that I'm helping police with their inquiries into the mysterious disappearance of my wife.

Certain tapes will no doubt have been removed from my house for expert examination.

It will all be because I'm trying to learn machine code. And Andrea isn't helping.

Normally I'd be tucked away in the spare bedroom out of sight but A.'s having it redecorated. She's hired a little man with an allergy to cheques who tells me that he's "got a video games machine" as well.

Anyway, me and my beeb are stuck down in the front room under A.'s all-seeing eye as I struggle through "Machine Code for Morons". And A. has started to Try To Take An Interest In Hubby's Hobby.

I swear I'm going to cancel those women's magazines. It's because of them

that all the time I've been slaving over a hot assembler, A.'s been there asking every kind of question but the ones I know the answer to!

My big mistake was to let out a shout of joy when I'd finally got my first machine code program to work. All it did was to print "HELLO" on the screen but to me it was a work of genius. Of course A. didn't see it that way.

"What's so good about that?" she asked.

"It's all done in machine code", I replied proudly.

"But why do it in machine code when you can do it in Banal or whatever it is you normally use?"

"Because it's faster", I said ignoring the dig.

"Faster!" she snorted, "It's taken you hours to do that".

Then, like the fool I so regularly am, I started to explain the basics of machine code. I told her how the BBC Micro's

built-in assembler saved me having to mess around with the op codes and made things that much simpler.

"But that's cheating!" she yelled. "It's not you that's doing the machine code, it's the micro".

With that she departed to the kitchen leaving me with the parting shot that all these registers and assemblies reminded her of school.

That was bad enough, but worse was to come. As I was plinging away on my micro I heard her singing the Hokey Cokey in the kitchen. Nothing wrong with that, of course, just a little eccentric.

No, it's not the song that's had me looking round for a blunt instrument that won't show fingerprints. It's the words she's singing to the tune:

You increment Y, you increment X,
And load the accumulator with zero zero hex . . .

I despair! Yours, Bob.

Next month in

THE MICRO USER

Will 1984 be the Year of the Disc?

Sales of disc drives for the BBC Micro are soaring as more and more users turn to this ultra-fast and secure means of storage.

Next month's *The Micro User* focuses on the disc drive revolution and tells you:

- WHAT a disc system is: an easy to follow description.
- WHY disc based storage can be the answer to many of your programming headaches.
- HOW to use your system to full effect: a thorough examination of the DFS commands, together with three invaluable utilities.

Whether you're at the stage of considering buying discs, or are already an experienced disc user, you'll find lots of interesting, useful information in the next issue of *The Micro User*.

Many regular readers of *The Micro User* have been complaining that their newsagent has run out of copies.

It's a problem we are urgently trying to sort out with our distributors. Meanwhile, you have two ways of making sure you don't miss YOUR copy each month:

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Johnny Reb

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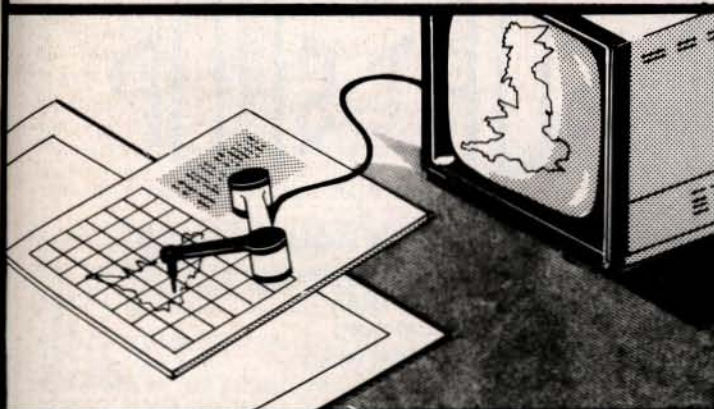
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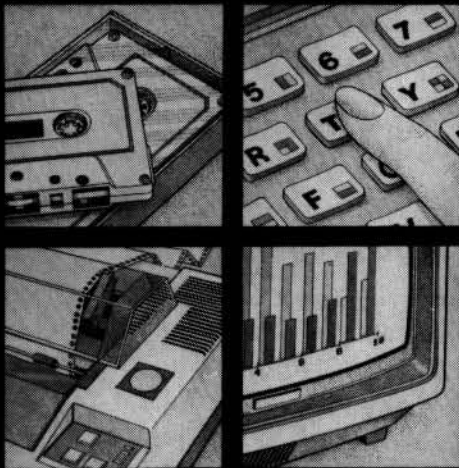


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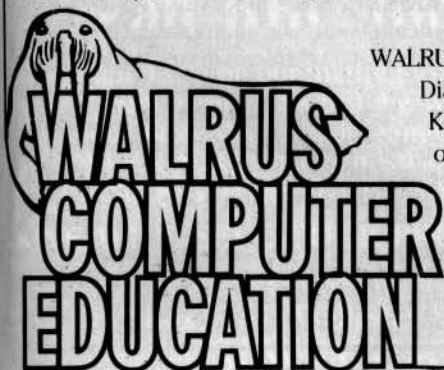
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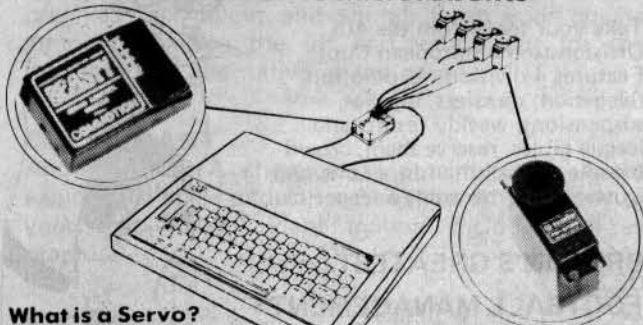
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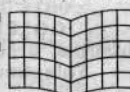
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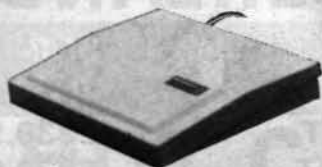
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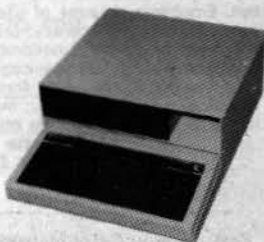
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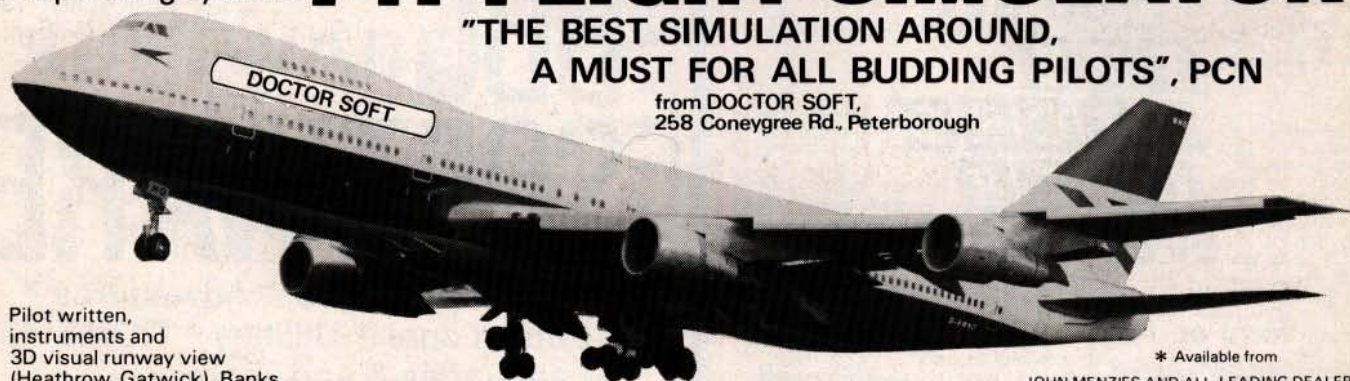
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